Banking on the Firm Objective

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Abstract

In the U.S., credit unions lent as much as 10-20 percentage points more relative to commercial banks during the Great Recession. Comparing institutions that faced similar borrowers within narrowly-defined local credit markets and similar crisis exposures shows the effect is supply-driven. Balance sheet mechanisms, loan pricing, informational advantages, tax benefits, and regulation do not explain results. Rather, higher lending was sustained by lower profit margins, suggesting that cooperative and member-oriented firm objectives led the $1.4 trillion dollar credit union industry to lend more relative to profit-maximizing banks.

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JEL Classifications: D22, G01, G21, L21, L33, P13

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1 Introduction

Since at least the seminal article by Friedman (1970), academic literature has often assumed profit maximization as the firm's ultimate goal by default. Consequently, relatively little research has been done to understand the effects of deviations from this objective on firm behavior.[1] A significant number of established businesses with alternative objectives, such as cooperatives, employee-owned firms, and non-profits have been overlooked as a result. As pointed out by Hansmann (1996) however, "...one need not have a strong interest in alternative forms to find the comparative study of organizational types instructive. We learn much more about [investor-owned firms] by comparing them with other forms of enterprise." These businesses are also prevalent in industries such as health care, housing, utilities, and agriculture, and employ as much as 13 percent of the U.S. workforce (U.S. Census, 2014). Moreover, close to 200 chief executives of the largest corporations have recently committed to take into account benefits to all firm stakeholders, warranting further research on the effects of a stakeholder business framework (Business Roundtable, 2019).

This paper empirically investigates the effect of firm objectives on investment and profitability by analyzing the lending behavior of traditional banking firms in the U.S. during the Great Recession. The traditional banking sector—whose core business is to take in deposits, provide basic financial services, and issue loans to borrowers—provides a promising laboratory for the analysis because it is mainly comprised of commercial banks and credit unions. Underlying firm objectives distinguish the two types, and are backed institutionally by each firm's ownership structure. Whereas commercial banks are owned by shareholders and maximize profits, credit unions are non-profit cooperatives designed to provide financial services to member-owners, who are also the depositors and borrowers in the institution.

Credit unions have more than doubled in size over the last few decades. Although traditional banking is still dominated by commercial banks, total assets of credit unions have grown to $1.4 trillion as of 2018 or over 9 percent of bank assets.[2] In addition, credit

[1] Recent work investigating the profit motive, such as Magill, Quinzii, and Rochet (2015) and Hart and Zingales (2017), focus specifically on the usual framework that prioritizes returns for shareholders. According to Jensen (2002), "200 years worth of work in economics and finance indicate that social welfare is maximized when all firms in an economy maximize total firm value."

[2] For additional comparison, sectors with similar assets are issuers of asset-backed securities ($1.1 trillion), finance and mortgage companies ($1.5 trillion), funding corporations ($1.4 trillion) (Financial Accounts of

unions serve over 110 million people and issue as much as 27 percent of consumer loans in traditional banking. Despite its widespread reach however, recent banking research has tended to disregard this industry.[3] A main contribution of this paper is to document the significant and robust difference in lending between banks and credit unions during the Financial Crisis of 2008. To the best of my knowledge, this is the first micro-level analysis comparing the lending activity of banks and credit unions during this time.[4]

Empirical challenges arise due to the non-random assignment of objectives to firms. Simply comparing overall lending of banks and credit unions will be biased since these institutions are different in dimensions other than objectives. To alleviate this concern, the analysis focuses on a loan product whose expected profitability fell during the crisis. In particular, standard mortgage originations reported in the Home Mortgage Disclosure Act (HMDA) have two features that are useful. First, these loans are typically purchased by government sponsored agencies (GSE's) which impose strict guidelines on borrower characteristics. This feature controls for demand factors. Second, the GSE's increased loan selling fees during the crisis and, as a result, these loans became more costly to sell. Taken together, expected net profit margins on these loans fell for both institutions. In this paper, the main hypothesis is that credit unions continued to lend standard mortgages under the goal of providing financial services rather than maximizing profits.

The baseline analysis is a difference-in-differences specification comparing average bank and credit union lending to homeowners living in a census tract before and after the crisis. The data used links over 130 million loan applications from HMDA to regulatory call reports, reflecting both loan-level activity and firm financial health. Average local economic and demographic characteristics that drive household decisions are included as controls. Time-varying economic conditions affecting all institutions are absorbed by interacted census tract and year fixed effects. To account for balance sheet mechanisms, the model is saturated with

the United States, 2018).

[3]A few exceptions are Ramcharan, Verani, and van den Heuvel (2016), who study the effect of MBS losses on lending using institutional features of credit unions, and DeYoung, Goddard, McKillop, and Wilson (2016) who study the cost efficiency of credit unions. However, both implicitly assume that credit unions and banks behave similarly and follow the same business model.

[4]Popular press has acknowledged that credit unions fare better during financial crises. See, for example, the *New York Times* article "The Appeal of Credit Union Mortgages" published on July 10, 2015 and *The Economist* article "Winning Converts: a venerable form of banking comes back into fashion published on October 31, 2015."

various pre-crisis balance sheet characteristics such as size, leverage, profitability, delinquencies, and chargeoffs. In addition, exposure to repurchase lending, participation in secondary loan markets, commercial paper issuance, off-balance sheet commitments, and holdings of private-label mortgage backed securities are included to mitigate the concern banks were disproportionately affected by the crisis. Lastly, unobserved time-invariant firm characteristics are absorbed by firm-level fixed effects.

Several findings support the idea that firm objectives affected bank and credit union lending during the crisis. First, credit unions were less sensitive to the financial crisis relative to their banking counterparts, lending an average of 10-20 percentage points more during the crisis. Figure 1 illustrates the aggregate implications of this striking result.[5] More specifically, growth of standard purchase mortgages were an average of 14 percentage points higher for credit unions relative to banks in the post-crisis period, and as much as 30 percentage points higher in 2014. Prior to the crisis, bank and credit union loan growth rates trended in parallel and only deviated from trend starting in 2008. In addition, lending fell for banks that one would expect to be more heavily affected by the crisis *ex ante*, such as large and highly-levered institutions. Lastly, credit unions operated under lower profitability margins, suggesting that credit unions sustained lending despite its effect on profits.

Differential sensitivity of borrowers to local to local economic conditions which could result in differential demand for loans threatens the identification of a supply-side story but is not supported by the data. First, loan-level mortgage data show that borrower clientele of banks and credit unions are similar on average. Second, differential demand could also manifest in borrowers seeking other types of credit, yet results are robust across mortgage and lending categories. Still another concern is that borrowers switched towards credit unions, which would not fully undermine the supply-side story but may strengthen the observed effect through an increase in demand. However, credit unions did not experience a surge in new membership during the crisis.

Alternative economic mechanisms arising from institutional differences do not support the observed divergence in lending. Interest rates offered by banks and credit unions did not differ in the post-crisis period, suggesting that the effect primarily worked through quantities

[5]Aggregate industry data show that credit union lending was also less sensitive than bank lending in the previous recession (see Figure A1). This paper focuses on the crisis due to limitations in micro-level data.

rather than prices. Another concern is that the common bond requirement—a defined criteria that members must satisfy—might alleviate information asymmetry and lower screening and monitoring costs for credit unions. However, results continue to hold when focusing on credit unions whose membership restrictions are only based on borrower location. The concern that the tax exemption for credit unions provide them with an unfair competitive advantage is invalidated by investigating effective taxes paid by banks. Lastly, both institutions face similar regulatory environments. Both receive deposit insurance with the same limits, have access to government liquidity facilities, and satisfy similar capital requirements.

This paper highlights that the slow recovery of lending disproportionately occurred within the profit-maximizing sector, a novel perspective relative to the vast literature that has focused primarily on commercial and shadow banking sectors.[6] This result has potential policy implications because the slow recovery after the crisis has puzzled researchers and policymakers alike.[7] In particular, credit unions provided a form of borrower protection to households, which is an important goal of the Dodd-Frank Wall Street Reform and Consumer Protection Act.[8] Relaxing limits to credit union investment and membership requirements may be beneficial for increasing the supply of credit. However, the empirical setting in this paper focuses on lending behavior after a negative shock rather than a positive shock, and does not explore how objectives determine the pre-crisis characteristics of banks and credit unions. Also, the partial equilibrium analysis does not address whether encouraging household debt is beneficial from welfare perspective.

Related Literature. The influential idea of maximizing shareholder dividends traces back to Friedman (1962) and Friedman (1970), who argued that businesses are not individuals and should not be concerned about corporate social responsibility. Lazonick and O'Sullivan (2000) document the rise of maximizing value as a prominent corporate governance principle starting in the 1970's. Kitzmueller and Shimshack (2012) highlight that profit maximization is a prevalent assumption even if goals such as corporate social responsibility

[6] A large literature investigates the financial crisis in these sectors. For example, see Brunnermeier (2009), Gorton (2009), Krishnamurthy (2010), Purnanandam (2011), Gorton and Metrick (2012).

[7] For example, see a speech by Federal Reserve Chairman Janet Yellen in Jackson Hole in August 2016, nine years after the start of the crisis: "In light of the slowness of the economic recovery, some have questioned the effectiveness of asset purchases and extended forward rate guidance."

[8] Title X of the Dodd-Frank Act, entitled the "Consumer Financial Protection Act of 2010," creates a bureau for regulating consumer financial products and services. Title XIV, entitled the "Mortgage Reform and Anti-Predatory Lending Act," imposes regulation on loan origination and underwriting standards.

and community development are often included as part of stated objectives. In fact, Margolis, Elfenbein, and Walsh (2009) find the link between corporate and social performance for shareholder-owned firms to be positive but small empirically.

Save for a few exceptions, much of existing academic research has focused on shareholder-owned firm as a result. On the empirical side, Adelino, Lewellen, and Sundaram (2015), investigate investment decisions of non-profit hospitals. On the theoretical side, Fama and Jensen (1985) explore the objectives of non-profits. Hart and Moore (1996) and Hart and Moore (1998) differentiate a profit-maximizing firm from a non-profit cooperative through their ownership structures. Magill et al. (2015) propose a theory of a stakeholder rather than a shareholder firm. Within the framework of a shareholder-owned and controlled firm, a few research papers investigate the effects of firm objectives on economic activity and welfare. Hart and Zingales (2017) argue that maximizing shareholder welfare is not the same as maximizing shareholder value when profits and externalities are inseparable.

Research focused specifically on banking has followed this trend, hence studies on credit unions have been limited. Black and Dugger (1981) and Kaushik and Lopez (1994) provide a description of the growth of credit unions prior to the 1980's. Frame, Karels, and McClatchey (2002) look at the effect of regulations expanding membership of credit unions but do not compare activity with banks. Feinberg and Rahman (2006) compare interest rates offered by credit unions to those of small banks, but do so for a different time period.

The rest of the paper proceeds as follows. Section 2 provides institutional details on credit unions and develops the hypothesis. Section 3 describes the empirical strategy and the data. Section 4 presents results highlighting the role of firm objectives in credit provision. Section 5 invalidates alternative supply-side economic mechanisms. Section 6 concludes.

2 Background and Hypothesis

2.1 Institutional Setting

The Federal Credit Union Act of 1934 established credit unions as non-profit cooperatives designed to provide financial services to its members. In contrast, banks are designed to

be profit-maximizing financial institutions.[9] In the U.S., the first credit unions rose to prominence during the Great Depression to assist households who were not able to obtain credit through traditional means. As their presence spread through the country, President Roosevelt passed a law authorizing federal credit union charters. By the 1960's, the vast majority of credit unions still active today had been established.[10] Since 1985, total assets in credit unions has risen from around 3 percent of commercial banking assets to around 9 percent in 2018.[11] The rest of this section describes important institutional features of banks and credit unions to guide the formulation of empirical tests in later sections (see Table 1).

Loans and investments. Banks and credit unions both engage in consumer and mortgage lending to households. However, the Credit Union Act restricts several credit union activities. In particular, the ratio of business lending to total assets is capped at 12.25 percent. In addition, there are limits to holding certain types of financial securities as investments, and there is a maximum interest rate that credit unions can charge on loans.

Membership. Banks do not have any borrower-specific membership limits or requirements. In contrast, credit union members are united under a *common bond* as stipulated in each firm's charter bylaws. The bond can be anything from a specified occupation, religious association, well-defined community, or geography. Historically, members of a particular credit union were united by a single common bond; for example, public school teachers, policemen or military employees grouped together to service the financial needs of their peers. In 1998, President Clinton passed the Credit Union Membership Access Act which significantly expanded the scope of credit union membership. In particular, the Act allowed smaller single-bond groups to combine to form multi-bond institutions, and expanded the coverage of geographically-based credit unions. The Act also allowed *select employee groups* (SEG's) to affiliate with larger and well-established credit unions.[12] Credit union members

[9] See Chapter 12 of the US Code for current laws regarding both banks and credit unions.

[10] In the data, 87 percent of credit unions were established before 1970. As of 2003, over 99 percent of credit unions had been established. Once a credit union is chartered, it rarely switches to a bank charter. Between 1995-2007, Wilcox (2007) identifies 33 credit union conversions to other charters (banks or mutual thrifts). For perspective, there were over 20,000 institutions between 2003-2013.

[11] Credit unions also have a large global presence. According to a report by the World Council of Credit Unions, as of 2017 there were close to 90 thousand credit unions in 117 countries, with over 260 million members (WOCCU, 2018).

[12] As of 2016, 18 percent of credit unions have a community bond, 17 percent have a single bond (including employee-, faith- and association-based), 27 percent have multiple common bonds, and 39 percent are state chartered.

receive benefits in the form of access to credit, higher returns on saving, or lower rates on borrowing.

Governance. Credit unions are governed under a *one person, one vote* principle. Banks are governed by shareholders whose influence is proportional to the size of the ownership stake. Both banks and credit unions elect board members who then choose the management team of the institution.

Equity capital. Banks and credit unions can both increase equity capital through retained earnings. Banks have the additional option of raising capital from outside investors who own the equity capital, retain control rights, and receive dividends from ownership. Credit unions cannot access outside equity markets in a similar fashion, which naturally limits their growth relative to banks. The equity of credit unions does not directly pay out dividends and is not owned in the same way that bank equity directly owned by shareholders. The first order role of equity is to satisfy regulatory capital requirements.

Capital requirements. Both Banks and credit unions are subject to capital requirements. Before the financial crisis, bank capital requirements were at 8 percent using total capital (Tier 1 plus Tier 2), and 4 percent using Tier 1 capital.[13] Credit unions were categorized as well-capitalized with an equity-to-assets ratio of 7 percent, and larger institutions were required to satisfy a risk-based net worth of 6 percent.[14] These are reported to their respective regulators. Credit unions are regulated by the National Credit Union Administration (NCUA), while banks are regulated by the (FDIC), the Office of the Comptroller of the Currency (OCC) or the Federal Reserve.[15]

Deposits and deposit insurance. Depositors at a credit union own *shares* or *share drafts*, which provide the same financial services as deposit checking accounts for banks.[16] The U.S. government provides and fully backs deposit insurance for both banks and credit unions. The Federal Deposit Insurance Corporation (FDIC) insures banks, while the National Credit Union Share Insurance Fund (NCUSIF) insures credit unions. To alleviate

[13]See Final Rule on Risk-Based Capital Standards (Federal Register Vol. 72, No. 235, December 2007).

[14]See 2007 annual edition of the Code of Federal Regulations §702.102.

[15]Both types of institutions also have the option to be chartered at the state level and be regulated by their corresponding state financial regulators. 37 percent of credit unions are state chartered. In terms of total assets, 51 percent were held by state-chartered credit unions.

[16]These accounts are named such since depositors are the only providers of capital. Share drafts of credit unions as referred to as deposits throughout the paper.

bank run concerns during the recent financial crisis, the insured deposit limit was raised from $100,000 to $250,000 per depositor in 2008 for both banks and credit unions.

Taxes. As a non-profit cooperative under Section 12 of the U.S. Code, credit unions are exempt from paying federal, state and local income taxes. Banks and banking associations often argue that the tax exemption of credit unions provides them with a distinct advantage in the market for providing financial services.[17]

2.2 What are the Objectives of Banks and Credit Unions?

The difference in objectives between banks and credit unions can be characterized under the theoretical framework of Hart and Moore (1998). This theory provides a rationale for profit-maximizing and cooperative objectives of firms by emphasizing the difference between *outside* ownership and *inside* ownership. Profit-maximizing firms have owners that are separate or outside the production process and do not necessarily consume the firm's goods. Consequently, shareholders are primarily concerned with returns to their capital investment. In contrast, cooperatives have inside owners that directly produce or consume the firm's goods and in the process derive benefits that are not paid in terms of profits. [18] Under the theory of the control view of ownership, which emphasizes the owner's residual rights of control (Grossman and Hart, 1986; Hart and Moore, 1990), it follows that objectives of these two institutions are closely aligned with the incentives of their respective owners.

The intuition follows for banks and credit unions, which provide highly similar credit and depository financial services to households but follow different objectives as a consequence of their ownership structures. On one hand, bank shareholders as outside owners are primarily viewed as capital providers and do not directly consume the financial services produced by the bank. Banks therefore maximize profits for their shareholders who receive dividends in return for capital investment. On the other hand, credit union members as inside owners directly receive financial services through access to credit, lower borrowing

[17]For example, see December 7 2016 lawsuit filed by the American Bankers Association against the credit union regulatory agency, National Credit Union Administration: "Because federal credit unions are exempt from federal taxes and most state taxes, restrictions on the size of federal credit unions are essential to prevent credit unions from obtaining an unfair competitive advantage over banks and other financial institutions that do not enjoy tax-exempt status."

[18]It is outside the scope of this paper to try to address the question why profit maximizing institutions care about profits. Hansmann (1996) provides an extensive discussion of how and why firms with different ownership structures arise in finance and in other industries.

rates and/or higher savings rates. This feature supports the non-profit cooperative nature of credit unions.

Under this theoretical characterization, it is important to note that there is a direct one-to-one relationship between ownership structure and objectives. In principle, one can also think of a cooperative firm that only provides benefits to its shareholders, or a profit-maximizing company that does not provide returns to its shareholders. However, both are harder to justify economically and in reality. As a result, the rest of the analysis will not attempt to disentangle the two as separate economic mechanisms and is left for future research.

2.3 Conceptual Framework and Hypothesis

This section presents a conceptual framework that develops the main empirical hypothesis of the paper by highlighting the difference in firm objectives of banks and credit unions. Because the goal is not to propose a new theory, the model is kept as simple as possible and issues that are typically relevant in a banking model are not included. The key feature is that financial firms are allowed to take into account the benefits that borrowers receive from loans, nesting the case of banks and credit unions. The framework draws from Smith, Cargill, and Meyer (1981) whose model of credit unions maximizes member benefits from profits, loans and saving.

Consider a financial institution that determines lending activity under an objective function that places weight on the benefits that borrowers receive from loans: $(1-\lambda)\,\pi + \lambda\,U(L)$.[19] Let L denote the level of lending, U be the utility function of the borrower with standard properties $U'(L) > 0$ and $U''(L) < 0$, and π be the profits from operations. Let $\lambda \in [0, 1)$ be the weight placed on borrower's utility where the natural interpretation is that for banks, $\lambda = 0$, while for credit unions, $\lambda > 0$. The financial institution earns profits from loan returns less the cost of deposits and newly issued loans: $\pi(s, L) = R_L(s)L - R_D(s)D - s\phi(L)$. Let $s > 0$ be the fundamental state of the economy where higher values of s denote worse states of the world. Returns to loan issuance is given by $R_L(s)$. Let D denote deposits

[19]Similarly, Hart and Zingales (2017) propose a payoff structure that is a weighted average of private benefits and social surplus. In the stakeholder theory of Magill et al. (2015), the social optimum is achieved by properly allocating weights to consumers, workers and other stakeholders.

and $R_D(s)$ be the cost of deposits. Both types of financial institutions are price-takers. For simplicity, assume a partial equilibrium setting where the profitability of loans falls in bad times, i.e. $R'_L(s) < 0$, and the cost of deposits increases, i.e. $R'_D(s) > 0$. In addition, banks and credit unions face the same cost of issuing loans. This cost is captured by $s\phi(L)$, an increasing and convex function of loan issuance: $\phi'(L) > 0$ and $\phi''(L) > 0$. Assume that the financial firm is endowed with equity capital K that is held fixed over time and faces a balance sheet constraint $L = D + K$. Lastly, assume that bank owners, credit union owners, and depositors are different agents in the economy and that credit union members derive benefits only from loans.[20] To abstract from demand side effects, note that the state of the world only affects firm profitability and not borrower utility.

This simple framework produces some important empirical predictions about lending activity (see Appendix). First, the optimality condition under such an objective function implies that lending activity declines in bad times for both banks and credit unions, i.e. $\frac{\partial L^*}{\partial s} < 0$. This result is unsurprising and follows naturally from the assumption that in bad times the profitability of loans decreases, the cost of loan issuance increases, and the cost of deposit funding increases. As long as the financial institution places some weight λ on profits, credit provision falls during financial crises. Second, the model predicts that the level of lending should be higher for financial institutions that place a higher weight on borrower utility, i.e. $\frac{\partial L^*}{\partial s} > 0$. This implies that the level of credit union lending should be higher than bank lending, holding all else equal. Third and most importantly, the model predicts that credit union lending, L^*_{CU}, does not fall by as much as bank lending, L^*_B, in bad states of the world, i.e. $\frac{\partial L^*_B}{\partial s} < \frac{\partial L^*_{CU}}{\partial s} < 0$. Credit unions mitigate the effects of an adverse shock on lending activity because they take into account the borrower utility in their optimization.

This third hypothesis provides a rationale for a difference-in-difference empirical specification. In particular, the first partial derivative with respect to s captures change in lending activity before and after an adverse profitability shock, while the second partial derivative with respect to λ compares this change for banks and for credit unions. This motivates the use of the recent financial crisis a widespread and unexpected shock that affected both banks and credit unions. In the empirical analysis, the crisis is used to reveal the relative impor-

[20] Credit union members can derive benefits from deposits, lower borrowing rates, and higher saving rates as well.

tance of underlying profit motives. It is important to note that the framework presented is only used to provide intuition and motivation the research design and several empirical issues need to be carefully addressed. In particular, the shock is assumed to affect profits rather than borrower utility in the model, yet there are numerous reasons to believe that borrower demand was dramatically affected by the financial crisis. In addition, the hypotheses presented are only valid holding all else equal for banks and credit unions. These demand-side and supply-side concerns are directly addressed in the construction of the dataset and formulation of the regression equation in the next section.

3 Empirical Strategy

Establishing the causal effect of firm objectives requires random assignment of objectives and borrowers to financial institutions, yet this ideal experiment is difficult to conduct in reality. An alternative is to use a source of variation directly affecting profitability to reveal the relative importance of the profit motive for banks and credit unions. The recent financial crisis provides this variation and is useful for several reasons. First, the financial crisis stemmed from shadow banking activities rather than the traditional lending markets banks and credit unions focus on. The negative shock that both were exposed to was arguably outside of their direct control. Second, previous literature has extensively documented that costs of funding spiked during the crisis, narrowing the spread financial institutions can earn on new lending and directly impacting expected profitability. In particular, Krishnamurthy (2010) argues that the crisis was a crisis of debt markets, Gorton and Metrick (2012) emphasize the freeze in liquid funding from the repo market, and Purnanandam (2011) investigate the collapse of the originate-to-distribute lending model.[21] Third, the breadth and scope of the crisis make it unlikely that another shock caused the dramatic changes in lending activity. Given that the occurrence and timing of the crisis was relatively unexpected, other research papers have exploited various aspects of this shock for analysis.[22] Lastly, effects of the crisis

[21] See Brunnermeier (2009) and Gorton (2009) for a survey of the literature on the financial crisis.

[22] For example, Ivashina and Scharfstein (2010), who investigate the effect of a funding shock on the syndicated corporate loan market in 2008, Santos (2011) who looks at loan pricing following the crisis and Aiyar (2012) who looks at the transmission of financial shocks in the US on global banks. Chodorow-Reich (2014) and Greenstone, Mas, and Nguyen (2014) have explored the real effects of the crisis on firm outcomes and employment.

can be examined and disentangled using micro-level data.

The real estate market is an ideal setting for investigating how banks and credit unions behaved given a similar investment opportunities and increases in the cost of lending. Both types of institutions actively participated in mortgage lending and detailed loan-level data that define an investment opportunity clearly and narrowly are available. More importantly, the cost of issuing mortgages directly increased during the crisis, affecting the expected profitability on these investments. Freddie Mac and Fannie Mae (GSE's) both imposed several rounds of additional post-settlement delivery fees and new loan-level price adjustments (LLPAs) on mortgages during the crisis, the first of which was an "Adverse Market Delivery Charge" of 25 basis points to all whole loan mortgages purchased and delivered as of March 2008.[23] Further empirical challenges that naturally arise from studying banks and credit unions during a crisis are addressed by the research design and is discussed in the remainder of this section.

3.1 Data Sources and Summary Statistics

Information on the supply and demand of credit is required to analyze the effect of objectives on lending. This is obtained from combining three main data sources: commercial bank call reports (FFIEC 031), credit union call reports (Form 5300) and the Home Mortgage Disclosure Act (HMDA). Unless otherwise specified, the sample period is from 1999-2014. Details about the construction of the dataset are in Appendix Section 2.

Firm-level balance sheet and income statement information for the universe of chartered banks and credit unions are available from regulatory call reports where many variables can be consistently defined over time (Appendix Table A1). Relevant financial and performance characteristics in the pre-crisis period are summarized in Table 2. Given the size distribution, a separate column distinguishes the largest 50 banks in terms of total assets.[24] On the liabilities side, call report data reveal that leverage ratios are comparable between the two

[23]This charge was implemented in December 2007. A timeline of important increases in GSE fees is reproduced from a Federal Housing Finance Agency report in Appendix Table A2.

[24]The largest credit union is the Navy Federal Credit Union with total assets of $81 billion in 2013 is comparable in size to the 50th largest bank. Around three-quarters of banks control $100 million or more in assets, while only one-quarter of credit unions are above this threshold. There are over 230 credit unions with assets over $1 billion, making them comparable in size to the largest 10 percent of banking institutions. In addition, regulation is often different for the largest banking institutions.

types, albeit credit unions rely more on deposits. On the asset side, credit unions allocate a lower fraction of assets on loans and concentrate in consumer lending (auto loans, student loans, home equity lines of credit, and unsecured loans). Both banks and credit unions engage in off-balance sheet lending (undrawn lines of credit and loan commitments). Banks appear more profitable than credit unions despite having higher delinquencies, providing early evidence that banks prioritize profits.

Loan-level activity for banks and credit unions is available for the real estate market through HMDA and is summarized in Table 3. Mortgage application information such as the location of the property, terms of the loan, and borrower characteristics are observed and provide a comprehensive view of market demand. Mortgage lending is a significant market that both banks and credit unions engage in. Although banks issued more purchase loans and credit unions issued more home equity loans, refinancing activity is similar between the two. Both mostly issue conventional, owner-occupied, 1-4 family loans. There does not appear to be a large disparity in the economic and demographic characteristics of bank and credit union clientele, with the exception that credit union borrowers have lower incomes on average. Note that HMDA reporting is required only for institutions above a size threshold with offices in a metro area, covering around half of commercial banks and around a fifth of credit unions (see Table 2).[25] The HMDA data include over 131 million loans for the entire sample period.

Both HMDA and call report data show that banks and credit unions were geographically dispersed across the U.S. Figure 2 shows the percent of mortgage originations in credit unions by county according to the location of the borrower before and after the crisis.[26] These maps suggest that credit unions were not concentrated in one region and there is variation in credit union presence across and within states heavily affected by the crisis (specifically Arizona, California, Florida, and Nevada).

[25]The size threshold (in terms of total assets) rose from $33 million in 2000 to $44 million in 2013. In the data, reporting firms account for an annual average of 88 percent of bank real estate loans and 91 percent of credit union real estate loans.

[26]Figure A2 shows the share of total assets in credit unions across states according to the headquarters of the institution.

3.2 Baseline Specification

The baseline model is the following difference-in-differences specification:

$$y_{ict} \;=\; \beta\, \text{post}_t \cdot \text{CU}_i \;+\; \gamma\, \text{post}_t \cdot X_i \;+\; \gamma_b\, \text{borrower}_{ict} \;+\; \eta_{ct} \;+\; \eta_i \;+\; \epsilon_{ict} \qquad (1)$$

where y_{ict} is the logarithm of the dollar amount of loans originated by institution i to borrowers located in census tract c in year t from the HMDA data. The credit union indicator, CU_i, is set to 1 for credit unions. The post-financial crisis indicator, post_t, is set to 1 starting in 2007. Previous work has identified mid-2007 as the start of the crisis, when several mortgage-backed securities could not be valued (for example, Acharya, Philippon, Richardson, and Roubini (2009)) while others have used the failure of Lehman Brothers as an unexpected exogenous shock which occurred in Q3-2008 (e.g., Ivashina and Scharfstein, 2010; Chodorow-Reich, 2014). To be conservative, the first crisis period is $t = 2007$.

The coefficient of interest is β, which captures the difference in pre- and post-crisis loan growth rates for banks and credit unions. Institution-level characteristics from call reports, X_i, control for balance sheet mechanisms and mitigate the concern that banks might have been disproportionately affected by the crisis. This includes size (log of total deflated assets), book leverage (total debt to total equity), share of assets invested in loans, share of assets in real estate, share of assets in cash, net interest margin, retained earnings, and write-downs (net charge-offs to lagged total assets). Also included are exposures to markets that collapsed during the financial crisis: amount of loans sold in secondary loan markets, investments in private-label mortgage-backed securities, funding obtained through federal funds and repurchase markets, funding through other forms of debt such as commercial paper, and off-balance sheet lending such as unused commitments and undrawn lines of credit (all normalized by lagged total assets). These firm-level controls are based on pre-crisis averages to avoid the bad controls problem (Angrist and Pischke, 2008). The controls are defined as terciles (-1 for lowest third, 0 for middle third, 1 for top third), and are assigned to all census tracts that an institution lends to. The controls are interacted with post_t to allow pre-crisis characteristics to explain any changes observed in the post-crisis period. Firm-level variables that capture previous investment decisions and are less likely to be responses to the crisis shock are included as is (i.e. not pre-crisis averages and not

interacted with post_t). This includes return on assets (net income to lagged total assets) and delinquencies (loans up to 90-days delinquent to lagged total assets). Lastly, an indicator for the largest 50 banks according total assets in the prior year and this indicator interacted with post_t are included to capture any changes in the behavior of large banks after the crisis. All variable definitions are listed in Appendix Table A1.

Average borrower characteristics, borrower_{ict}, capture features of the applicant pool faced by each institution i within each census tract c in each year t. Economic characteristics include average income, loan amount, debt-to-income ratio, and the fraction of loans sold to government sponsored enterprises (GSE's) within the year. Demographic characteristics include the fraction of male applicants, the fraction of white applicants, and the fraction of African-American applicants. Census tract-year interacted fixed effects,η_{ct}, capture any time-varying unobserved local shocks faced by all banks and credit unions in the same area. This controls for the possibility that credit unions tend to be located in higher or lower loan growth areas. Note that the U.S. Census defines census tracts as small geographic units with relatively homogeneous population characteristics, economic status, and living conditions, and has an average of 4,000 inhabitants. η_i are firm-level fixed effects that account for time-invariant factors that lead to constant differences in lending across all census tracts that each institution lends to, including any operational, managerial and cultural practices. Given that exposures to the crisis through the balance sheet are different for each institution, standard errors are clustered at this level.[27]

Important for identification is the assumption that credit provision by banks and credit unions would have followed pre-crisis trends absent the financial crisis. Evidence in support of parallel trends is shown using a dynamic version of Equation 1 in Section 4.

3.3 Controlling for Demand Factors

Any attempt to argue that firm objectives played a key role in credit markets requires disentangling supply and demand forces. If bank and credit union borrowers were differentially affected by the financial crisis, then observed lending patterns could be due to borrower risk profiles rather than firm characteristics or investment decisions. In addition to including borrower_{ict}, unobserved characteristics are further controlled for in the baseline regression

[27] Results are robust to clustering at the state level.

by focusing on a subsample of plain vanilla *standard* loans: conventional, conforming (non-jumbo), owner-occupied, 1-4 family, first lien mortgages.[28] Guidelines that allow for these loans to be included in government-backed securities issued by the GSE's ensure a standardized borrower profile. Focusing on standard mortgages also ensures that the investment opportunity, hence the expected revenue stream from the loan, is the same from the perspective of the lender.

4 Empirical Results

4.1 Growth of Mortgage Lending

Table 4 reports estimates of β in Eq.(1) and measure the difference in bank and credit union lending before and after the financial crisis. The baseline model coefficient shown in Column (1) is statistically significant at 0.144 and translates to 15.5% more lending for credit unions relative to commercial banks in the post-crisis period. Recall that this regression focuses on standard purchase mortgages, a subsample with a homogenous borrower risk profile compared to other types of lending in HMDA. Estimates for other loan types range from 0.073 (7.6%) for standard home equity loans to as high as 0.214 (23.9%) for non-standard home equity loans. Refinance loans have statistically significant coefficients of 0.165 (17.9%) and 0.145 (15.6%) for standard and non-standard loans, respectively. This was an important loan category for homeowners during the low interest rate environment after the crisis. Across all loan types, the coefficient is 0.186 (20.4%), showing significantly more lending by credit unions relative to banks.

The following dynamic regression tests whether these effects vary over time:

$$y_{ict} \;=\; \sum_{t \neq 2006} \beta_t \cdot \delta_t \cdot CU_i \;+\; \gamma \,\text{post}_t \cdot X_i \;+\; \gamma_b \,\text{borrower}_{ict} \;+\; \eta_{ct} \;+\; \eta_i \;+\; \epsilon_{ict}. \qquad (2)$$

Instead of comparing pre- and post-crisis lending, β_t now compares the difference in lending between banks and credit union between year t and $t = 2006$. Baseline estimates for standard

[28] Conventional mortgages are those not guaranteed by the government either through the Federal Housing Administration (FHA), Veteran's Administration (VA), Farm Service Agency (FSA) or Rural Housing Service (RHS). Jumbo loan limits change annually and are set by the GSE's.

purchase mortgages plotted in Figure 3 show that credit union lending significantly differed from banks starting in 2008. In 2008, the estimate is statistically significant at 0.138 (14.8%), which rises to 0.279 (32.2%) in 2014. Persistence in the divergence of lending behavior between banks and credit unions closely mirrors the path of aggregate lending shown in Figure 1. More importantly, these estimates provide strong support for the parallel trends assumption that lending growth for banks and credit unions trended similarly in the pre-crisis period and would have continued on this trend absent the crisis. Robustness in these patterns across other types of mortgage lending are shown in Appendix Figure A4.

Expanding Eq.(1) into a triple difference-in-differences specification sheds light on how balance sheet characteristics might explain the difference in lending between banks and credit unions. In the following regression:

$$y_{ict} = \beta\ \text{post}_t \cdot \text{CU}_i + \gamma_1 \text{post}_t \cdot X_i + \gamma_2 \text{post}_t \cdot X_i \cdot \text{CU}_i + \gamma_b \text{borrower}_{ict} + \eta_{ct} + \eta_i + \epsilon_{ict} \quad (3)$$

the triple interaction term with coefficient γ_2 allows for the possibility that balance sheet characteristics have differential effects on lending activity depending on the type of institution, rather than assuming that balance sheet mechanisms are the same for banks and credit unions. Table 5 presents coefficient estimates for the baseline sample that continues to focus on standard purchase mortgages. The most important takeaway is that β remains positive and statistically significant at 0.042 (4.3%). Economic mechanisms that are not fully captured by important balance sheet measures result in increased lending by credit unions post-crisis.

It is useful to compare γ_1, which captures how banks of a certain financial health characteristic responded, to $\gamma_1 + \gamma_1$, which captures how corresponding credit unions responded. An estimate 0.021 for ROA means that more profitable banks lent 2.1% more relative to less profitable banks, while 0.004 (0.4%) suggests profitability did not determine credit union lending significantly. This suggests that profitability is an important driver of bank lending rather than credit union lending. Delinquencies on previously issued loans did not appear to affect new bank lending but are positively associated with credit union lending. This is consistent with the story that credit unions continue to provide credit even if borrowers who have previously taken out loans face difficulty in repaying loans. Unsurprisingly, firm size

is an important characteristic. The coefficient for larger banks is -0.025 (-2.5%) suggesting a lending decline for larger institutions, while the total coefficient for credit unions is 0.019 (1.9%), suggesting an opposite effect credit unions. Lastly, variables that capture exposures to the financial crisis—namely holdings of private-label MBS, loans for sale, participation in repo markets and issuance debt other than deposits—negatively impacted both bank and credit union lending, which is reassuring. Overall, data suggest that ex-ante profitable banks with high net interest margins and a high share of assets in loans lent significantly more in the post-crisis period. Large banks that were more exposed to the crisis withdrew lending. Meanwhile, larger, highly-levered credit unions with more non-performing loans had higher lending growth. Those with a higher fraction of assets in real estate lending, with higher interest margins and more exposures to the crisis lent less.

In terms of borrower characteristics, average income, debt-to-income ratio, loan size, and fraction of loans sold to GSE's are associated with higher loan growth. Areas with a higher fraction of male, white applicants are also associated with more lending, compared to areas with more African-American applicants.

4.2 Balance Sheet Performance

The economic mechanisms behind the differential changes in mortgage lending can be better understood in the context changes in other balance sheet activities. In the following regression:

$$y_{iCt} = \beta^f \text{ post}_t \cdot \text{CU}_i \ + \ \gamma^f \text{ post}_t \cdot X_{it} \ + \ \eta_{ct} \ + \ \eta_i \ + \ \epsilon_{ict} \tag{4}$$

y_{iCt} represent firm-level outcomes and C is now the county of the institution headquarters.[29] All other variables are defined as in the HMDA-based regressions. Standard errors are clustered at the state level. Table 6 presents results for broad lending categories. In particular, y_{ict} is the 4-quarter log difference in total loan amounts deflated by the Consumer Price Index (=2009) for consumer credit, real estate lending, business lending including commercial and industrial loans, and off-balance sheet activity including unused commitments and

[29]Based on HMDA, 70 percent of institutions perform the majority of their mortgage lending in the county of the headquarters. Results are robust to focusing on these institutions.

undrawn lines of credit. Across different loan categories, similar patterns appear compared to mortgage lending. The results appear to be relatively weak for real estate loans, and are stronger for consumer credit, business lending and off-balance sheet lending. Unsurprisingly, coefficient estimates with total loans and leases on balance sheet as the dependent variable are positive and significant, suggesting that credit unions lent as much as 6 percentage points more relative to banks. Estimates for a dynamic version of Eq. 4 are plotted in Figure A4. lending growth for credit unions was higher by as much as 10 percentage points relative to banks, consistently remaining positive and statistically significant throughout the post-crisis period. Local economic and demand conditions are not as carefully controlled in firm-level analysis relative to loan-level regressions, but these results suggest that higher credit provision was not concentrated in the mortgage market.

Table 7 provides further results on how the the rest of the balance sheet changed. Banks declined in size more than credit unions and there was no significant differential changes in leverage. As a share of total assets, cash-like investments declined for credit unions suggesting that banks shifted towards holding safer assets. Net operating profit after tax (NOPAT) and the ratio of net income to lagged total assets (ROA), which are both measures of profitability, declined for credit unions after the crisis. Together with the results on credit provision, it appears that credit unions sustained lending and operated under lower profitability margins relative to banks, supporting the idea that the cooperative and non-profit motive of credit unions affected credit provision. The results on lending in conjunction to the results on profitability do not necessarily imply that credit unions were issuing unprofitable loans. Making this conclusion would require data on borrower risk and characteristics all types of lending. However, focusing on the subsample of standard loans, ensures that the expected revenue is similar for both banks and credit unions (i.e. they are similar NPV opportunities from the lender's perspective).

5 Testing Alternative Mechanisms

5.1 Differential Demand

Focusing on standard mortgage originations controls for average characteristics of the borrower, but does not control for possible differential levels of demand. In addition, simply comparing the number of mortgage applications to compare overall demand is confounded by the possibility that the risk profile of applications for banks and credit unions faced differed. Focusing on originations rather than applications does not face this issue since the GSE's impose strict guidelines on origination. However, differential demand may still manifest in other ways. First, differential borrower sensitivity to local economic conditions could lead to borrowers moving away from banks towards credit unions. If so, credit union membership would have surged after the onset of the crisis. Banks unfortunately do not provide membership data so a regression analysis is not possible, but membership data for credit unions shown in Figure 4 does not support this conjecture. Given the paper's focus on firm decision-making, it is beyond it's scope to explain this borrower behavior. However, this is consistent with evidence of a sticky relationship between borrowers and financial institutions.[30] It appears that bank borrowers are denied credit, do not apply for credit union membership, and remain shut out of credit markets for some time. Second, differential demand could also manifest in borrowers demanding other forms of loans. For example, creditworthy bank borrowers might have turned to refinancing less than credit union borrowers. As seen in the results in Tables 4 and 7 however, credit unions still appear to have lent significantly more relative to banks.

5.2 Loan Pricing

Credit unions often provide member benefits through lower borrowing rates and could have attracted additional demand through favorable loan terms. This hypothesis is tested using interest rate data from SNL Financial, a weekly survey of rates that banks and credit unions

[30]Recent surveys conducted by the Consumer Financial Protection Bureau suggest that borrowers do not shop for mortgages, 80 percent apply only one loan, and the few who apply for more than one do not do so because of a previous denial (CFPB, 2013-2015). See also Lacko and Pappalardo (2007) and Amel, Kennickell, and Moore (2008).

offer on various asset and liability products. The weekly survey starts in 2007 and covers roughly 40 percent of banks and 30 percent of credit unions on the liability side, and 25 percent of banks and 20 percent of credit unions on the asset side. Despite its limited coverage, the data can still provide a sense of price dispersion among institutions. Coefficient estimates for Equation 4 with various mortgage interest rates as the dependent variable and t referring to a week are presented in Table 8. Because the baseline analysis focuses on standard mortgages, the relevant interest rate is the 30-year fixed mortgage rate in Column (1). This shows that banks and credit unions did not offer significantly different interest rates in the post-crisis period and lending activity was not driven by different borrowing rates. There are also no significant differences in adjustable rates for mortgages or home equity lines of credit (HELOC) rates. Credit unions appear to have offered lower home equity loans to borrowers however so that the results on lending are driven by both quantities and prices.

5.3 Informational Advantages

Credit unions potentially have an informational advantage over banks due to the common bond requirement, a unifying characteristic that all members of a credit union must satisfy according to its charter. For example, the largest credit union in the US, the Navy Federal Credit Union, restricts membership to those affiliated with the armed forces. Other criteria include having the same employer, working in the same industry, or living in a specified area. Because these requirements systematically match borrowers to lenders, screening and monitoring costs for credit unions may be lower due to informational advantages that naturally occur due to a common bond. In the last few decades however, many credit unions have chosen a community-based charter so that anyone who lives, works or goes to school in a specified geographical area (usually on a county level) is eligible for membership. Since borrower location is less informative about creditworthiness compared to employment status, there is no strong ex-ante reason to believe that community credit unions have informational advantages over community banks. Both understand local economic conditions and both are equally accessible from the perspective of the borrower.

To distinguish between community and non-community credit unions, the βCU_i Eq. 1 is broken down into $\beta_1 \text{post}_t \cdot \text{CommunityCU}_i + \beta_2 \text{post}_t \cdot \text{NonCommunityCU}_i$. The coefficient β_2 captures the difference between community credit unions and banks that are not due to

informational advantages resulting from income- or employer-based familiarity with member characteristics. Table 9, which presents estimates for both β_1 and β_2, shows that results do not qualitatively change when focusing on community credit unions. Panel A shows that lending by community credit unions continue to be significantly higher relative to bank lending in the post-crisis period for standard purchase mortgages, with a coefficient of 0.119 (12.6%). Results also continue to hold qualitatively across non-standard, home equity and refinance mortgage loans. Panel B also shows community credit unions sustained lending relative to banks across other loan types. Lastly, Panel C shows that growth in community credit unions higher relative to banks and appears to have been financed with higher leverage ratios. These credit unions also held less cash a fraction of total assets and were less profitable relative to their banking counterparts.

5.4 Tax Exemption for Credit Unions

Another mechanism that can potentially drive post-crisis lending is that credit unions are tax exempt as non-profit organizations. Banks often lobby against credit unions by arguing that taxes inhibit bank lending activity and the tax exception is an unfair advantage.[31] If this argument were true, then banks that pay relatively lower taxes should have lent more relative to banks that pay higher taxes. This is tested using a version of Eq 1 where βCU_i is replaced with $\beta_1 \text{post}_t \cdot \text{HiTaxBank}_i + \beta_2 \text{post}_t \cdot \text{LoTaxBank}_i$ and banks are categorized into high-tax bins and low-tax bins according the average of the ratio of effective taxes paid to lagged total assets in the pre-crisis period. Note that the set of banks rather than credit unions is split into subsamples so that the sign and interpretation of estimated coefficients is the opposite that in previous tables. Overall, the decline in lending for high-tax paying banks relative to credit unions appears to be less than the decline in lending low-tax paying banks. Table 10 shows that while low tax banks appear to have withdrawn lending less in the mortgage market (Panel A), lending across various loan markets in fact show the opposite effect (Panel B). In terms of balance sheet performance (Panel C), low tax paying

[31] In a lawsuit filed against the National Credit Union Administration (NCUA) in December 2016, the American Banking Association (ABA) argued that "because federal credit unions are exempt from federal taxes and most state taxes, restrictions on the size of federal credit unions are essential to prevent credit unions from obtaining an unfair competitive advantage over banks and other financial institutions that do not enjoy tax-exempt status."

banks grew less relative to high tax paying banks. High tax paying banks appear to have de-levered more compared to low-tax paying banks. This is consistent with the notion that higher tax rates increase the incentive of firms to take on debt due to its tax deductibility, and a mounting pressure to de-lever during a financial crisis pushed leverage down. Lastly, both high-tax and low-tax banks operated at higher profitability margins in the post-crisis period.

5.5 Regulatory Environment

Still another concern is potential differences in regulatory treatment of banks and credit unions. In particular, respective regulators might have implemented different policies, resulting in different lending decisions. It turns out that there are no significant differences in important financial regulations for banks and credit unions that are typically studied in the academic literature. Both types of institutions receive deposit insurance backed by the full-faith of the U.S. government. In 2008, limits on insured deposits for were raised for both types from $100,000 to $250,000 per depositor. In addition, both had access to the Federal Reserve's discount window and to liquidity programs such as the Troubled Asset Relief Program (TARP). Both are required to satisfy similar capital requirements based on the Basel guidelines. To mitigate the concern that large banks face more stringent regulations or may benefit from *too-big-to-fail* provisions, a large bank indicator is included in all regressions in the analysis.

6 Conclusion

Lending activity of banks and credit unions differed significantly in the recent Great Recession. Credit unions lent by 10-20 percentage points more relative to their banking counterparts to borrowers of similar risk profiles. Differences are striking and significant across many loan categories including mortgages, consumer, business and off-balance sheet lending. Analysis of balance sheet performance show that banks increased their holdings of cash-like assets once the crisis unfolded, while retaining higher profit margins relative to credit unions. Differences in lending activity and performance highlight the importance of firm objectives on lending decision. Whereas banks are profit-maximizing firms, credit unions are coop-

erative non-profits designed to prioritize providing their members with financial services. Alternative economic mechanisms such as loan pricing, informational advantages, taxes or the regulatory environment are not supported in the data.

Contrary to the notion of a widespread credit freeze during the crisis, this paper shows that a well-established industry continued to issue credit and cushioned borrowers against tight lending markets. Because consumer protection is one of the major goals of the Dodd-Frank Act, policymakers may want consider supporting credit unions to mitigate the transmission of adverse financial shocks to the real economy. For example, relaxing current limits to credit unions are worth considering. More broadly, this paper encourages research on the importance of firm objectives in other industries.

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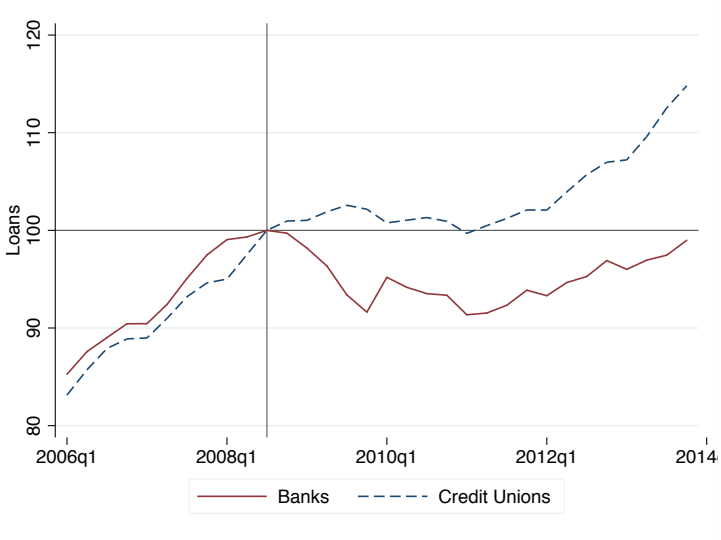
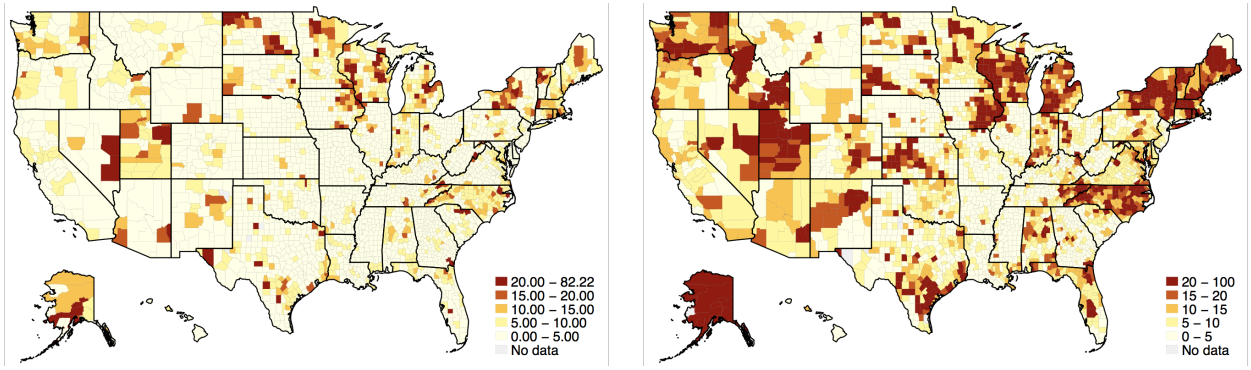
7 Figures

Figure 1. Total Lending by Commercial Banks and Credit Unions



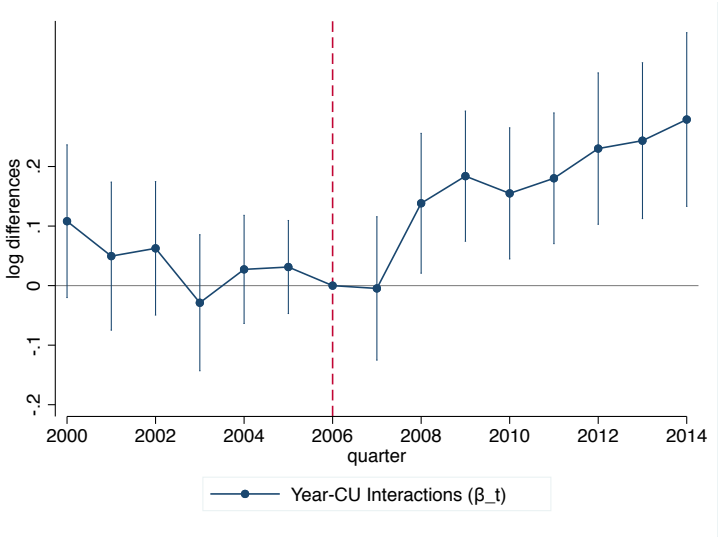
Note. This graph plots aggregate loans and leases for commercial banks (solid) and credit unions (dashed), before and after the Great Recession. Loan levels are normalized to 100 in 2008-Q3, when Lehman Brothers collapsed. Source: FL764023005, FL474023000 in 2018-Q3 Financial Accounts of the United States.

Figure 2. Percent of Lending in Credit Unions Before and After the Crisis



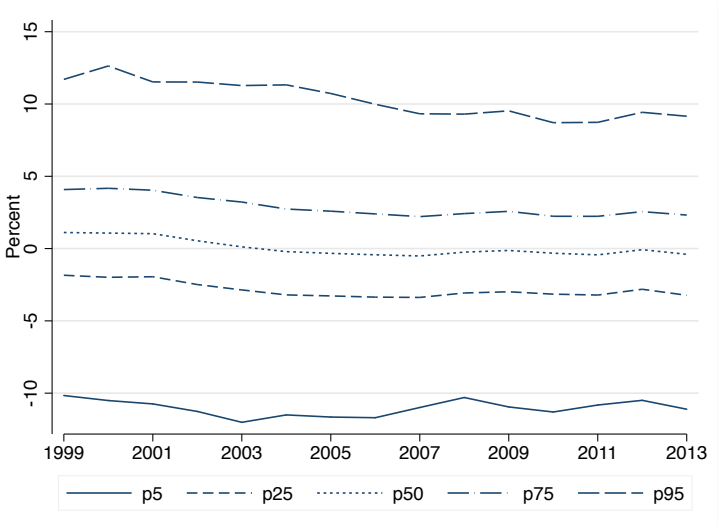
Note. These maps show the percent of mortgage loans originated by credit unions relative to banks before the Great Recession, in 2006 (left panel), and after, in 2013 (right panel), according to the county of the borrower. Source: HMDA.

Figure 3. Dynamic Effects



Note. This plots β_t coefficient estimates for the following difference-in-differences regression: $y_{ict} = \sum_t \beta_t \cdot \delta_t \cdot CU_i + X'_{it}\gamma + \text{borrower}_{ict}\gamma_b + \eta_i + \eta_{ct} + \epsilon_{ict}$, a dynamic version of (1) in Table 4. The dependent variable is log originated loan amounts of standard purchase mortgage originations in HMDA between year t and $t-1$ for institution i for borrowers located in census tract c. δ_t are year dummies, X_{it} are balance sheet characteristics interacted with post_t, borrower_{ict} are average demographic and economic characteristics of the pool of applicants, η_i are firm fixed effects, and η_{ct} are census tract-year interacted fixed effects. The sample period is from 2000-2014. Left-out observations are in 2006 (dashed line). Error bars reflect the 95% confidence intervals. Standard errors are clustered at the institution level.

Figure 4. Membership in Credit Unions Over Time



Note. This graph shows the percentiles of the growth rate of credit union membership over time. Source: Form 5300.

8 Tables

Table 1. Institutional Background

	Commercial Banks	Credit Unions
Objective	Profit-maximizing	Cooperative, non-profit
Owners	Equity *(outside)*	Members *(inside)*
Owner benefit	Dividends	Lower borrowing rates, higher savings rates, access to credit, access to services
Governance	Proportional to shares	One member, one vote
Borrower access	No limit	Common bond membership
Source of equity	Retained earnings, raised externally	Retained earnings
Capital requirements	4-8%	6-7%
Deposit insurance	Yes	Yes
Corporate taxes	Not exempt	Exempt

Table 2. Summary Statistics of Balance Sheet Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	All Institutions			Institutions in HMDA		
	CU's	Banks		CU's	Banks	
Variable		Small	Top 50		Small	Top 50
Total Assets, (Mil, 2009 $)	68.5	494.6	103,927.5	231.1	563.2	120,833.6
Log(TA)	2.3	4.7	11.0	4.5	5.1	11.1
Total Liabilities/TA	86.1	88.9	88.9	88.5	89.5	88.9
Deposits/TA	85.0	82.4	68.8	86.8	82.7	68.9
Cash/TA	13.0	5.3	6.4	8.6	4.9	5.8
Lending Categories						
Total Loans/TA	59.9	62.0	59.6	64.9	64.9	67.4
Real Estate Loans/TA	12.8	39.4	25.2	26.0	43.9	31.4
Consumer Loans/TA	46.7	6.5	12.8	38.7	6.1	11.7
Business Loans/TA	0.6	12.2	18.7	1.3	12.6	20.6
Off-Balance Sheet/TA	7.3	10.7	32.1	14.7	12.7	38.0
Performance Measures						
NOPAT	0.58	0.78	0.94	0.76	0.79	0.93
Return on Assets	0.11	0.25	0.43	0.20	0.26	0.42
Return on Equity	0.99	2.61	4.39	1.87	2.87	4.24
Net Interest Margin	0.90	1.06	0.97	0.89	1.10	0.96
Retained Earnings/TA	0.06	0.05	0.11	0.14	0.07	0.11
Delinquencies	1.22	0.87	1.34	0.57	0.81	1.35
Net Chargeoffs	0.11	0.07	0.19	0.10	0.07	0.17
Crisis-Related Exposures						
Loans for Sale/TA	0.04	0.23	2.06	0.10	0.30	2.09
Private-label MBS/TA	0.41	0.17	1.61	1.21	0.21	1.39
Federal Funds and Repos/TA	0.01	1.54	8.34	0.02	1.84	7.54
Other Debt (Incl CP)/TA	0.39	3.89	11.25	0.95	3.92	11.24
No. Institutions (1999-2013)	11,210	11,655	105	2,543	6,353	68
No. Firm-Years (1999-2013)	128,973	120,743	714	36,023	69,203	508

Note. This presents summary statistics of balance sheet characteristics based on bank and credit union call reports during the pre-crisis period (1999-2006). (1)-(3) include all institutions, while (4)-(6) include institutions that are above a size threshold determined by HMDA. Small excludes the largest 50 by total assets. Other than total assets, all variables are winsorized at the 1 percent level. Sources: FFIEC 031, Form 5300.

Table 3. Summary Statistics for Pre-Crisis Mortgage and Borrower Profiles

	(1) Credit Unions	(2) Banks	(3)
		Small	Top 50
Loan Type			
Purchase Loans, %	0.21	0.36	0.32
Home Equity Loans, %	0.26	0.13	0.11
Refinance Loans, %	0.53	0.51	0.57
Conventional, %	0.98	0.93	0.95
Owner-occupied, %	0.95	0.89	0.92
First Lien, %	0.61	0.82	0.79
1-4 Family, %	0.96	0.96	0.97
Jumbo, %	0.02	0.05	0.07
High Priced, %	0.03	0.10	0.11
Spread if High Priced, pp	5.28	5.04	5.28
Loan Sold within Year, %	0.18	0.44	0.39
Loan Sold to GSE, within Year, %	0.51	0.56	0.67
Loans Originated, %	0.89	0.81	0.75
Borrower Characteristics			
Average Income of Borrower ($ Thous)	75.66	79.85	88.22
Average Loan Size ($ Thous)	95.75	123.86	142.10
Average DTI	1.47	1.83	1.91
Male, %	0.62	0.65	0.62
Race, White, %	0.71	0.70	0.65
Race, Black, %	0.05	0.06	0.08
Ethnicity, Hispanic, %	0.07	0.11	0.11
Lender Information (2000-2014)			
Total No. of Loans (Mil.)	11.6	83.3	50.1
Avg. No. of Loans per Inst-Tract-Yr	3	9	5
Avg. No. of Institutions per Tract-Yr	4	11	9
Avg. No. of Tracts per Inst-Year	110	19,590	177

Note. This presents summary statistics of mortgage loan and borrower characteristics for banks and credit unions during the pre-crisis period (2000-2006). Mortgage characteristics that are available starting in 2004 are marked (*). Source: HMDA.

Table 4. Growth of Mortgage Lending

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Standard			Non-Standard		All
	Purchase	Home Eq	Refi	Purchase	Home Eq	Refi	
Post*CU	0.144***	0.073	0.165***	0.170***	0.214**	0.145**	0.186***
	(0.030)	(0.069)	(0.041)	(0.048)	(0.100)	(0.070)	(0.053)
Borrower Controls	×	×	×	×	×	×	×
Firm Controls	×	×	×	×	×	×	×
Firm FE	×	×	×	×	×	×	×
Tract-Year FE	×	×	×	×	×	×	×
N	5,645,303	1,884,024	9,171,325	4,788,998	2,121,941	4,595,342	15,338,218
R-sq	0.51	0.68	0.48	0.62	0.59	0.67	0.52

Note. This presents β coefficient estimates for the following difference-in-differences regression: $y_{ict} = \beta \text{post}_t \cdot \text{CU}_i + \text{post}_t \cdot X'_{it}\gamma + \text{borrower}'_{ict}\gamma_b + \eta_i + \eta_{ct} + \epsilon_{ict}$. The dependent variable is log originated loan amounts of various types of mortgages in HMDA between year t and $t-1$ for institution i for borrowers located in census tract c. post_t equals 1 starting in 2007, X_{it} are balance sheet characteristics interacted with post_t, borrower_{ict} are average demographic and economic characteristics of the pool of applicants, η_i are firm fixed effects, and η_{ct} are census tract-year interacted fixed effects. The sample period is from 2000-2014. Standard errors are clustered at the institution level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively.

Table 5. Balance Sheet Mechanisms

	(1) Estimate	(2) std err	(3) Estimate	(4) std err	(5)
	β				
Post*CU	0.042*	(0.024)			
	γ_1		γ_2		$\gamma_1 + \gamma_2$
ROA	0.021**	(0.009)	-0.017*	(0.009)	0.004
Delinquencies	0.004	(0.016)	0.014	(0.023)	0.018*
Post*(Log TA)	-0.025*	(0.014)	0.044***	(0.017)	0.019*
Post*Leverage	0.019	(0.020)	0.006	(0.024)	0.025**
Post*(Loans/TA)	0.065***	(0.017)	-0.062***	(0.021)	0.003
Post*(Real Estate/TA)	0.000	(0.020)	-0.046*	(0.025)	-0.046***
Post*(Off-BS Items/TA)	0.013	(0.018)	-0.001	(0.020)	0.012
Post*(Cash/TA)	-0.001	(0.024)	0.018	(0.028)	0.017
Post*Net Interest Margin	0.045***	(0.013)	-0.077***	(0.017)	-0.033***
Post*(Retained Earnings/TA)	-0.010	(0.016)	0.025	(0.020)	0.015
Post*(Chargeoffs/TA)	-0.023	(0.018)	0.030	(0.023)	0.007
Post*(Private MBS Holdings/TA)	0.007	(0.011)	-0.015	(0.013)	-0.009
Post*(Loans for Sale/TA)	-0.039***	(0.008)	0.017	(0.012)	-0.022**
Post(Repos/TA)	-0.003	(0.012)	-0.027	(0.017)	-0.030**
Post*(Other Debt/TA)	-0.040***	(0.014)	0.026	(0.018)	-0.014
Top 50	-0.003	(0.059)			
Post*(Top 50)	0.030	(0.040)			
	γ_b				
Average Income	0.003***	(0.000)			
Average DTI	0.147***	(0.008)			
Average Loan Size	0.005***	(0.000)			
Share Male	0.022***	(0.003)			
Share White	0.028***	(0.006)			
Share Black	-0.050***	(0.019)			
Share Sold within Year	0.072***	(0.021)			
Firm FE			×		
Tract-Year FE			×		
N			5,645,303		
R-sq			0.52		

Note. This table presents all coefficient estimates for the following regression: $y_{ict} = \beta \text{post}_t \cdot \text{CU}_i + \text{post}_t \cdot X'_{it}\gamma_1 + \text{post}_t \cdot \text{CU}_i \cdot X'_{it}\gamma_2 + \text{borrower}_{ict}\gamma_b + \eta_i + \eta_{ct} + \epsilon_{ict}$. It is the triple difference-in-differences version of (1) in Table 4. The dependent variable is log originated loan amounts of standard purchase mortgage originations in HMDA between year t and $t-1$ for institution i for borrowers located in census tract c. post_t equals 1 starting in 2007, X_{it} are balance sheet characteristics interacted with post_t, borrower_{ict} are average demographic and economic characteristics of the pool of applicants, η_i are firm fixed effects, and η_{ct} are census tract-year interacted fixed effects. The sample period is from 2000-2014. Standard errors are clustered at the institution level and are reported in parentheses. (1)-(4) present coefficient estimates. (5) presents the total effect for credit unions and significance levels for the test of whether $\gamma_1 + \gamma_2 = 0$. ***, **, and * denote significance at the 1%, 5% and 10% level respectively.

Table 6. Growth of Other Lending on Balance Sheet

	(1) Real Estate	(2) Consumer	(3) Business	(4) Off-BS	(5) Total
			A. HMDA Subsample		
Post*CU	0.056***	0.071***	0.137***	0.143***	0.076***
	(0.011)	(0.012)	(0.031)	(0.019)	(0.010)
N	87,336	87,181	66,923	86,393	87,580
R-sq	0.44	0.31	0.36	0.32	0.50
			B. All Firms		
Post*CU	0.031**	0.064***	0.128***	0.113***	0.057***
	(0.013)	(0.009)	(0.030)	(0.021)	(0.012)
N	180,970	221,441	116,416	173,169	222,510
R-sq	0.38	0.28	0.35	0.27	0.42
Firm Controls	×	×	×	×	×
Firm FE	×	×	×	×	×
County-Year FE	×	×	×	×	×

Note. This table presents β coefficients for the following difference-in-differences regression: $y_{iCt} = \beta^f \text{post}_t \cdot \text{CU}_i + \text{post}_t \cdot X_{it}'\gamma^f + \eta_{Ct} + \eta_i + \epsilon_{iCt}$. The dependent variable is log difference of loans and leases for major categories of lending on the balance sheet between year t and $t-1$ for institution i with headquarters in county C. post_t equals 1 starting in 2007, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 1999-2013. Standard errors are clustered at the state level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively. Panel A focuses on the set of institutions above a size threshold that report in HMDA, while Panel B includes all banks and credit unions.

Table 7. Balance Sheet Performance

	(1) TA Growth	(2) Leverage	(3) Cash/TA	(4) NOPAT	(5) ROA
			A. HMDA Subsample		
Post*CU	0.072***	0.205	-2.906***	-0.366***	-0.040
	(0.008)	(0.187)	(0.428)	(0.103)	(0.071)
N	87,626	87,626	87,626	87,605	87,626
R-sq	0.50	0.78	0.64	0.76	0.64
			B. All Firms		
Post*CU	0.059***	-0.266	-3.175***	-0.480***	-0.127***
	(0.010)	(0.183)	(0.393)	(0.050)	(0.037)
N	223,342	223,342	223,342	223,286	223,342
R-sq	0.46	0.88	0.66	0.76	0.58
Firm Controls	×	×	×	×	×
Firm FE	×	×	×	×	×
County-Year FE	×	×	×	×	×

Note. This table presents β^f coefficients for the following difference-in-differences regression: $y_{iCt} = \beta^f \text{post}_t \cdot \text{CU}_i + \text{post}_t \cdot X'_{it}\gamma^f + \eta_{Ct} + \eta_i + \epsilon_{iCt}$. The dependent variables are balance sheet characteristics and performance measures for year t for institution i with headquarters in county C. post_t equals 1 starting in 2007, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 1999-2013. Standard errors are clustered at the state level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively. Panel A focuses on the set of institutions above a size threshold that report in HMDA, while Panel B includes all banks and credit unions.

Table 8. Did Credit Unions Offer Lower Rates?

	(1) Fixed	(2) Adjustable	(3) Home Eq	(4) HELOC
Post*CU	0.014	0.101	-0.340*	-0.251
	-0.100	(0.319)	(0.201)	(0.195)
Firm Controls	×	×	×	×
Firm FE	×	×	×	×
County-Year FE	×	×	×	×
N	11,591	6,377	19,735	25,524
R-sq	0.97	0.85	0.87	0.91

Note. This table presents β^r coefficients for the following difference-in-differences regression: $y_{iCw} = \beta^r \text{post}_w \cdot \text{CU}_i + \text{post}_w \cdot X'_{iw}\gamma^r + \eta_{Cw} + \eta_i + \epsilon_{iCw}$. The dependent variables are (1) 30-year fixed-rate mortgage rates, (2) adjustable mortgage rate, (3) home equity loan rates, and (4) home equity line of credit rates for week w for institution i with headquarters in county C. post_w equals 1 starting in 2008q3, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 2007-2013. Standard errors are clustered at the state level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively.

Table 9. Did Credit Unions Have Informational Advantages?

A. HMDA Regressions

	(1)	(2) Standard	(3)	(4)	(5) Non-Standard	(6)	(7) All
	Purchase	Home Eq	Refi	Purchase	Home Eq	Refi	
Post*(CCU)	0.119***	0.039	0.167***	0.125***	0.169*	0.054	0.166***
	(0.036)	(0.069)	(0.043)	(0.044)	(0.090)	(0.059)	(0.051)
Post*(NonCCU)	0.151***	0.088	0.164***	0.179***	0.226**	0.164**	0.191***
	(0.030)	(0.070)	(0.042)	(0.050)	(0.102)	(0.068)	(0.054)
N	5,645,303	1,884,024	9,171,325	4,788,998	2,121,941	4,595,342	15,338,218
R-sq	0.51	0.68	0.48	0.62	0.59	0.67	0.52

B. Balance Sheet Lending

	(1) Real Estate	(2) Consumer	(3) Business	(4) Off-BS	(5) Total
Post*(CCU)	0.041***	0.060***	0.151***	0.125***	0.065***
	(0.013)	(0.012)	(0.045)	(0.018)	(0.010)
Post*(NonCCU)	0.061***	0.075***	0.131***	0.149***	0.081***
	(0.011)	(0.012)	(0.035)	(0.019)	(0.010)
N	87,336	87,181	66,923	86,393	87,580
R-sq	0.44	0.31	0.36	0.32	0.50

C. Balance Sheet Performance

	(1) TA Growth	(2) Leverage	(3) Cash/TA	(4) NOPAT	(5) ROA
Post*(CCU)	0.062***	0.480**	-3.015***	-0.316***	-0.020
	(0.008)	(0.208)	(0.488)	(0.094)	(0.066)
Post*(NonCCU)	0.076***	0.100	-2.865***	-0.385***	-0.047
	(0.007)	(0.191)	(0.420)	(0.106)	(0.074)
N	87,626	87,626	87,626	87,605	87,626
R-sq	0.50	0.78	0.64	0.76	0.64

Note. This table distinguishes community credit unions from non-community credit unions with the following regression: $y_{ict} = \beta_1 \text{post}_t \cdot \text{CommunityCU}_i + \beta_2 \text{post}_t \cdot \text{NonCommunityCU}_i + \text{controls} + \epsilon_{ict}$. Community credit unions have geography-based common bond membership requirements, while non-community credit unions have stricter requirements (for example by occupation or employer). Panel A presents β_1 and β_2 coefficient estimates for originated loan amounts of various types of mortgages in HMDA, as in Table 4. Panel B presents estimates for major categories of lending on the balance sheet on an institutional level, as in Table 6. Panel C presents estimates for performance measures on an institutional level, as in Table 7. Panels B and C focus on institutions that report in HMDA. See notes in these tables for regression and sample details.

Table 10. Did Credit Unions Lend More Due to Tax Exemption?

A. HMDA Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Standard			Non-Standard		All
	Purchase	Home Eq	Refi	Purchase	Home Eq	Refi	
Post*(HiTax)	-0.172***	-0.114	-0.254***	-0.180***	-0.234**	-0.147**	-0.254***
	(0.035)	(0.076)	(0.043)	(0.054)	(0.105)	(0.072)	(0.061)
Post*(LoTax)	-0.138***	-0.071	-0.162***	-0.153***	-0.160*	-0.108	-0.130**
	(0.029)	(0.067)	(0.038)	(0.050)	(0.095)	(0.071)	(0.052)
N	5,645,303	1,884,024	9,171,325	4,788,998	2,121,941	4,595,342	15,338,218
R-sq	0.51	0.68	0.48	0.62	0.59	0.67	0.52

B. Balance Sheet Lending

	(1)	(2)	(3)	(4)	(5)
	Real Estate	Consumer	Business	Off-BS	Total
Post*(HiTax)	-0.037***	-0.045***	-0.125***	-0.125***	-0.055***
	(0.013)	(0.012)	(0.028)	(0.019)	(0.011)
Post*(LoTax)	-0.085***	-0.108***	-0.173***	-0.176***	-0.109***
	(0.014)	(0.021)	(0.043)	(0.024)	(0.014)
N	87,336	87,181	66,923	86,393	87,580
R-sq	0.44	0.31	0.36	0.32	0.50

C. Balance Sheet Performance

	(1)	(2)	(3)	(4)	(5)
	TA Growth	Leverage	Cash/TA	NOPAT	ROA
Post*(HiTax)	-0.055***	-0.407*	2.894***	0.473***	-0.007
	(0.008)	(0.226)	(0.428)	(0.106)	(0.069)
Post*(LoTax)	-0.098***	0.063	3.071***	0.187*	0.084
	(0.013)	(0.224)	(0.466)	(0.110)	(0.095)
N	87,626	87,626	87,626	87,605	87,626
R-sq	0.50	0.78	0.64	0.76	0.64

Note. This table distinguishes banks by tax burden with the following regression: $y_{ict} = \beta_1 \text{post}_t \cdot \text{HiTaxBank}_i + \beta_2 \text{post}_t \cdot \text{LoTaxBank}_i + \text{controls} + \epsilon_{ict}$. Tax burden is defined by average effective taxes paid by banks prior to the crisis. Panel A presents β_1 and β_2 coefficient estimates for originated loan amounts of various types of mortgages in HMDA, as in Table 4. Panel B presents estimates for major categories of lending on the balance sheet on an institutional level, as in Table 6. Panel C presents estimates for performance measures on an institutional level, as in Table 7. Panels B and C focus on institutions that report in HMDA. See notes in these tables for regression and sample details.

Banking on the Firm Objective: Appendix

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1 Conceptual Framework

Consider a financial institution that determines lending activity under an objective function that places some weight on the benefits that borrowers derive from receiving loans:

$$\max_{L} \quad \lambda U(L) + (1-\lambda)\pi(s, L) \tag{1}$$

Let L denote the level of lending, U be the utility function of the borrower with standard properties $U'(L) > 0$ and $U''(L) < 0$, and π be the profits from lending operations. Also assume that the third derivative of the utility function is positive: $U'''(L) > 0$ reflecting prudence (Kimball, 1990). Let $\lambda \in [0, 1)$ be the weight placed on borrower's utility where the natural interpretation is that for banks, $\lambda = 0$, while for credit unions, $\lambda > 0$. Profits are earned from returns from loans less the cost of deposits and newly issued loans:

$$\pi(s, L) = R_L(s)L - R_D(s)D - s\phi(L) \tag{2}$$

Let $s > 0$ be the fundamental state of the economy where higher values of s denote worse states of the world. Returns to loan issuance is given by $R_L(s)$ and assume the profitability of loans falls in bad times: $R'_L(s) < 0$. The cost of issuing loans is captured by $s\phi(L)$ which is increasing and convex in loan issuance: $\phi'(L) > 0$ and $\phi''(L) > 0$. Also assume that the third derivative of the cost function is zero: $\phi'''(L) = 0$ (as in a quadratic cost function). The cost of deposits D is given by $R_D(s)$ which increases in bad times: $R'_D(s) > 0$. Finally, assume that the financial firm is endowed with equity capital K that is held fixed over time and faces a balance sheet constraint $L = D + K$.

The optimal supply of lending, L^*, equates the marginal benefit and marginal cost of a loan and is given by the following condition:

$$\frac{\lambda}{1-\lambda}U'(L^*) + R_L(s) = R_D(s) + s\phi'(L^*). \tag{3}$$

Proposition 1. $\frac{\partial L^*}{\partial s} < 0$.

Proof. Use the envelope theorem and take the derivative of Eq 3 with respect to s to get:

$$\frac{\partial L^*}{\partial s} = \frac{-R'_L(s) + R'_D(s) + \phi'(L^*)}{\frac{\lambda}{1-\lambda}U''(L^*) - s\phi''(L^*)}.$$

The numerator is positive because $R'_L(s) < 0$, $R'_D(s) > 0$, and $\phi'(L) > 0$. The denominator is negative because $U''(L) < 0$ and $\phi''(L) > 0$. □

Proposition 2. $\frac{\partial L^*}{\partial \lambda} > 0$.

Proof. Use the envelope theorem and take the derivative of Eq 3 with respect to λ to get:

$$\frac{\partial L^*}{\partial \lambda} = \frac{R_L(s) - R_D(s) - s\phi'(L^*) - U'(L^*)}{\lambda U''(L^*) - (1-\lambda)s\phi''(L^*)}.$$

Using Eq 3, the numerator can be written as $\frac{-U'(L^*)}{(1-\lambda)}$ so that

$$\frac{\partial L^*}{\partial \lambda} = \frac{-U'(L^*)}{[\lambda U''(L^*) - (1-\lambda)s\phi''(L^*)](1-\lambda)}$$

The numerator is negative because $U'(L) > 0$. The denominator is negative because $U''(L) < 0$ and $\phi''(L) > 0$. □

Proposition 3. $\frac{\partial L_B^*}{\partial s} < \frac{\partial L_{CU}^*}{\partial s}$.

Proof. For ease of notation, define $x \equiv [\lambda U''(L^*) - (1-\lambda)s\phi''(L^*)](1-\lambda)$. Take the derivative of $\frac{\partial L^*}{\partial \lambda}$ in Proposition 2 with respect to s to get:

$$\frac{\partial^2 L^*}{\partial \lambda \partial s} = \frac{-U''(L^*)\frac{\partial L^*}{\partial s}x - U'(L^*)[\lambda(1-\lambda)U'''(L^*)\frac{\partial L^*}{\partial s} - (1-\lambda)^2\phi''(L^*) + s\phi'''(L^*)\frac{\partial L^*}{\partial s}]}{x^2}.$$

□

2 Data

2.1 Call Report Data

Financial statement call report data come from FFIEC 031 for commercial banks (https://cdr.ffiec.gov/public) and Form 5300 for credit unions (https://www.ncua.gov/analysis/credit-union-corporate-call-report-data/quarterly-data), both at a quarterly frequency. The data contain 12,122 unique commercial banks and 11,498 unique credit unions throughout the sample period. Observations with missing total assets and that involve merger activity are dropped. Over the last few decades, merger activity for both banks and credit unions has reduced the number of institutions by approximately half. Since 2003, 86 percent of credit union changes have been mergers, 7 percent have been conversions (to banks and mutual thrifts), and the rest have been liquidations, cancellations, purchase and assumptions. Variables are winsorized at the 1 percent level after transformations, and is done separately for banks and credit unions. Firms outside of the 50 U.S. states and Washington D.C. are excluded.

2.2 Call Report Variables

The following table lists variable definitions that are consistent according to the reporting instructions for forms FFIEC 031 for banks and Form 5300 for credit unions. Both forms change slightly over time as new variables are added to provide more granular information. Unless otherwise specified, the start refers to 1999-q4 and the end refers to 2013-q4.

Table A1. Call Report Variable Definitions

Variable	Bank Item	Credit Union Item
ASSETS		
Total Assets	RC: 12	010
Cash	RC: 1a + 1b	730 [start-2000q3]
	.	730a + 730b + 730c [2000q4-end]
Total Investments	RC: 2a + 2b + 3 + 5 + 8 + 9 [start-2001q4]	799 [start-2000q3]
	RC: 2a + 2b + 3a + 3b + 5 + 8 + 9 [2002q1-end]	799i [2000q4-end]
Investments: Securities and Trading Assets	RC: 2a + 2b + 5	797e + 796e + 965
Net Loans and Leases	(RC-C: 12) - (RC: 4c)	025b - 719
Loans for Sale	RC: 4a	003
LOANS AND LEASES		
Total Consumer Loans	RC-C: 6a + 6b + 6c [start-2010q4]	396 + 397 + 698 + 385 + 370 + 397a + 698a
	RC-C: 6a + 6b + 6c + 6d [2011q1-end]	.
Real Estate Loans	RC-C: 1	703 + 386
Business Loans	RC-C: 3 + 4a + 4b + Real Estate: Business	400l + 400l1 + 400 [start-2004q2]
	.	400l + 400l1 + 400a + 400b [2004q3-end]
INVESTMENTS (Unless otherwise specified, add fair value of held-to-maturity (Col B) and available-for-sale (Col D) securities)		
Securities: Other MBS	RC-B: 4a(3) + 4b(3) [start-2009q1]	.
	RC-B: 4a(3) + 4b(3) [2009q2-2010q4]	.
	RC-B: 4a(3) + 4b(3) + 4c(1)(b) + 4c(2)(b) [2011q1-end]	.
Trading: Other MBS	RC-D: 4c [start-2009q1]	.
	RC-D: 4c + 4e [2009q2-end]	.
Investments: Other MBS	Securities: Other MBS + Trading: Other MBS	732 [start-2008q2]
	.	981 [2008q3-end]
LIABILITIES AND EQUITY		
Total Liabilities and Equity	RC: 29	014
Total Liabilities	RC: 21	860c + 825a + 820a + 825 + 018
Leverage	Total Liabilities/ Total Assets*100	
Deposits	RC: 13a + 13b	018
Federal Funds and Repurchase Agreements	RC: 14 [start-2001q4]	058c
	RC: 14a + 14b [2002q1-end]	.
Other Debt (incl Commercial Paper)	RC: 16a + 16b + 16c [start-2000q4]	883c + 011c
	RC: 16 [2001q1-end]	.
Regular Deposits	RC-E: 7 (Col A)	902 + 657
Equity	Total Liabilities and Equity - Total Liabilities	
Dividends	RI-A: 7 + 8 [start-2000q4]	.
	RI-A: 8 + 9 [2001q1-end]	.
Dividends to Equity (DOE)	Dividends(t)/Equity(t-1)*100	
Tier-1 Capital	RC-R: 11	.
INCOME		
Interest and Fee Income on Loans	RI: 1a(1)(a) + 1a(1)(b) + 1a(1)(c) + 1a(1)(d) + 1a(1)(e) + 1a(1)(f)(1) + 1a(1)(f)(2) + 1a(1)(g) + 1a(1)(h)(1) + 1a(1)(h)(2) + 1a(1)(i) + 1a(2) [start-2000q4]	110
	RI: 1a(3) + 1b [2001q1-end]	.
Interest and Fee Income on Real Estate Loans	RI: 1a(1)(a)	.
Total Interest Income	RI: 1g [start-2000q4]	115
	RI: 1h [2001q1-end]	.
Non-interest Income	RI: 5g [start-2000q4]	117
	RI: 5m [2001q1-end]	.

Employee Compensation	RI: 7a	210
Net Interest Income (after provision for loan losses)	RI: 3 - 4	116
Net Income	RI: 12 [start-2008q4]	.
	RI: 14 [2009q1-end]	661a
Net Interest Margin	Net Interest Income / Total Assets(t-1) *100	Net Interest Income / Net Income *100
Fee Income	RI: 5b + 5f(1) + 5f(2)	131
	RI: 5b + 5f	.
Return on Assets (ROA)	Net Income(t) / Total Assets(t-1)*100	
Return on Equity (ROE)	Net Income(t)/Equity(t-1)*100	
Earnings Before Taxes	RI: 8	.
Taxes	RI: 9	.
Effective Taxes Paid	Taxes / Net Income *100	.
Retained Earnings	Net Income - Dividends	940 + 602
DELINQUENCIES (Unless otherwise noted, add all columns)		
Delinquencies: Real Estate	RC-N: 1a + 1b + 1c(1) + 1c(2)(a) + 1c(2)(b) + 1d + 1e + 1f [start-2006q4]	713 + 714 + 715 + 716 [start-2006q1]
	RC-N: 1a(1) + 1a(2) + 1b + 1c(1) + 1c(2)(a) + 1c(2)(b) + 1d + 1e(1) + 1e(2) + 1f [2007q1-end]	713a + 714a + 715a + 716a [2006q2-end]
Total Delinquencies	Delinquencies: Real Estate + Deposits + Agriculture + C&I + Consumer + Foreign + Other + Leases + Other Debt	041b
Chargeoffs	RI-B: 9 (Col A)	550
Recoveries	RI-B: 9 (Col B)	551
Net Chargeoffs	Chargeoffs - Recoveries	
OTHER ITEMS		
Employees	RI: M5	564a + 564b
Members	.	083
Potential Members	.	084
Bankrupt Members	.	971
Branches	.	566
OFF-BALANCE SHEET		
Off-balance Sheet Items	RC-L: 1a + 1b + 1c(1) + 1c(2) + 1e + 2 + 3 + 4 [start-2006q4]	814 + 814a + 811 + 812 + 813 + 815 + 816 [start-2004q4]
	RC-L: 1a + 1b + 1c(1)(a) + 1c(1)(b) + 1c(2) + 1e + 2 + 3 + 4 [2007q1-2009q4]	814 + 814a + 811 + 812 + 813 + 815 + 816 + 822 [2005q1-2008q4]
	RC-L: 1a + 1b + 1c(1)(a) + 1c(1)(b) + 1c(2) + 1e(1) + 1e(2) + 1e(3) + 2 + 3 + 4 [2010q1-end]	814 + 814a + 811 + 812 + 813 + 815 + 816 + 814a1 + 811a + 822 [2009q1-2009q3]
	.	814 + 814a + 811 + 812 + 813 + 815 + 816 + 814a1 + 811a + 811b + 811c + 822 [2009q4]
	.	816a [2010q1-end]

2.3 HMDA Data

Mortgage application data from the Home Mortgage Disclosure Act (HMDA) come from the Loan Application Register (LAR) ultimate public releases found in the National Archives (https://www.archives.gov/research/catalog). Data are available on an annual frequency for any mortgage lender satisfying the HMDA requirements. Only observations for banks and credit unions with non-missing firm identifiers are kept (other major lenders are savings/thrift companies and independent mortgage companies). For the sample period from 1999-2014, the raw data included 131 million observations for banks and credit unions. Observations with missing loan amounts are dropped. Observations that are identified to be purchase, refinance and home equity mortgage loans are included. Only originated or denied loans are included (other actions include accepted but not taken, withdrawn ap-

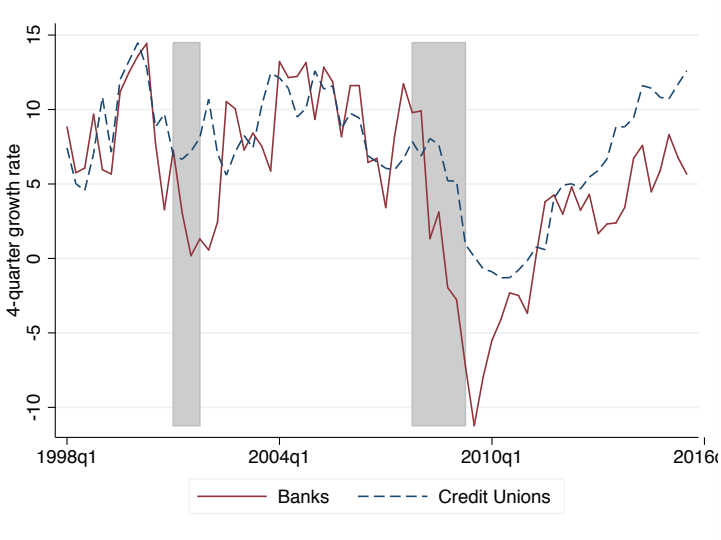
plications). Pre-crisis averages for lien, property type, high priced loans, and ethnicity variables start in 2004, when these variables were introduced. Conforming loan limits are set by the government sponsored enterprises (GSE's), Fannie Mae and Freddie Mac, and are taken from https://www.fanniemae.com/content/fact_sheet/historical-loan-limits.pdf. Census tract identifiers change depending on U.S Census conducted each decade. Crosswalk files from one census to the next are obeained from https://www.psc.isr.umich.edu/dis/data/resource/detail/1457.

2.4 Data Merge

Call report data and HMDA data are merged using a link file provided by Robert Avery, which provides the RSSD id consistent across the three datasets updated on an annual basis. The RSSD id only became available in credit union call reports starting in q3-2013. Since this RSSD rarely changes, this RSSD is used for the entire sample period for credit unions that survived until that quarter. However, many credit unions observations end prior to 2013 due to mergers, acquisitions or failures and therefore do not have RSSD id's readily available. To avoid selection bias issues that arise from excluding these credit unions, the RSSD id's of credit unions that are large enough to be included in HMDA each year are manually searched for and hand-collected from the National Information Center (NIC) database (https://www.ffiec.gov/nicpubweb/nicweb/nichome.aspx). The sample period for call reports ends in 2013 due to changes in reporting for banks. To have approximately the same number of years around the financial crisis (around 2007), the sample period starts in 1999. Since regressions using HMDA data include lagged call report variables, the HMDA sample is 2000-2014.

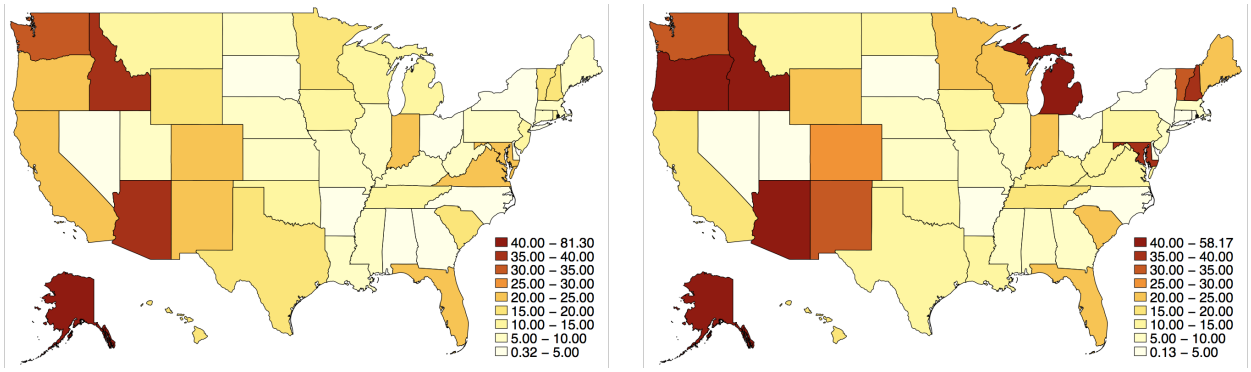
3 Additional Figures

Figure A1. Aggregate Lending by Commercial Banks and Credit Unions



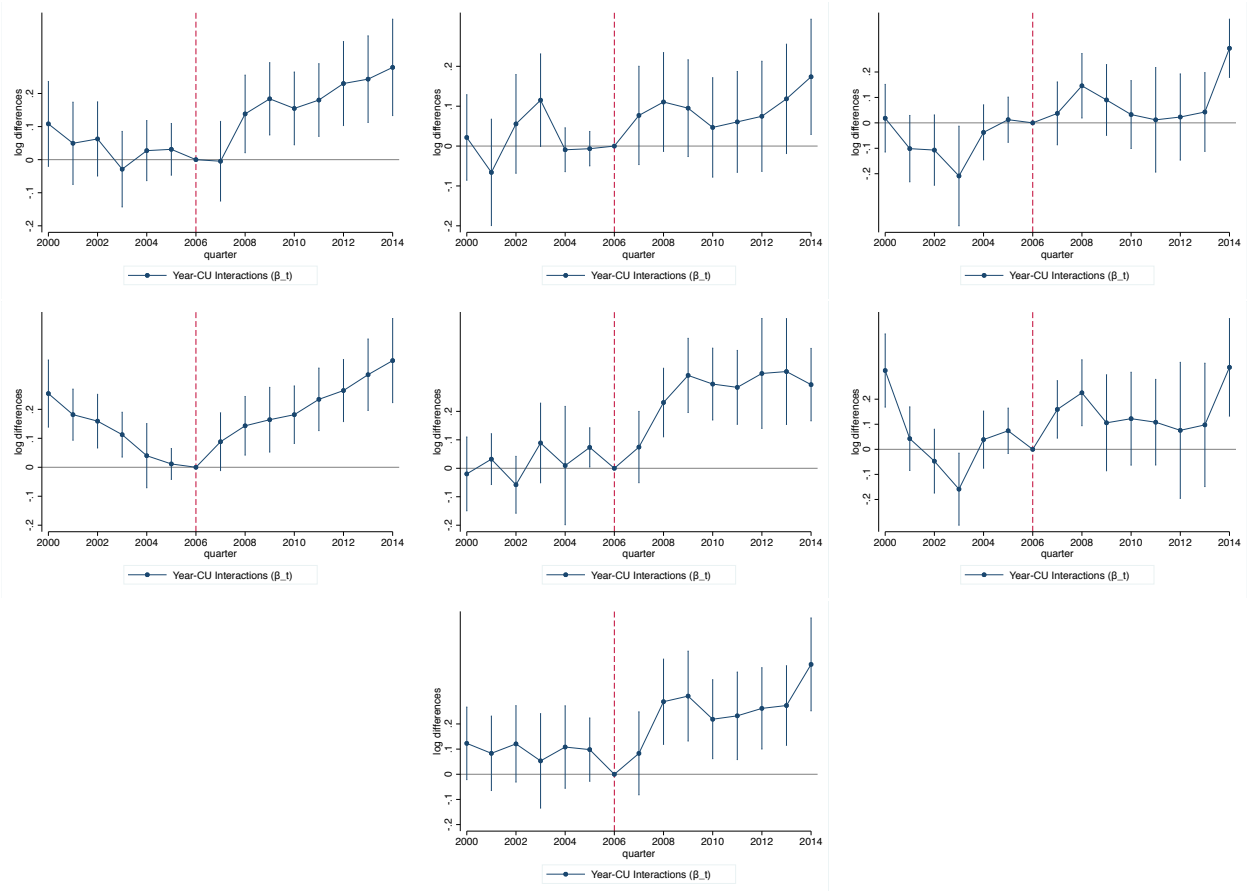
Note. This graph plots the annual growth rates of aggregate loans and leases for commercial banks (solid) and credit unions (dashed) starting in 1998, following a major amendment to the Federal Credit Union Act. Shading refers to NBER recessions. Source: FL764023005, FL474023000 in 2018-Q3 Financial Accounts of the United States.

Figure A2. Percent of Lending in Credit Unions Before and After the Crisis



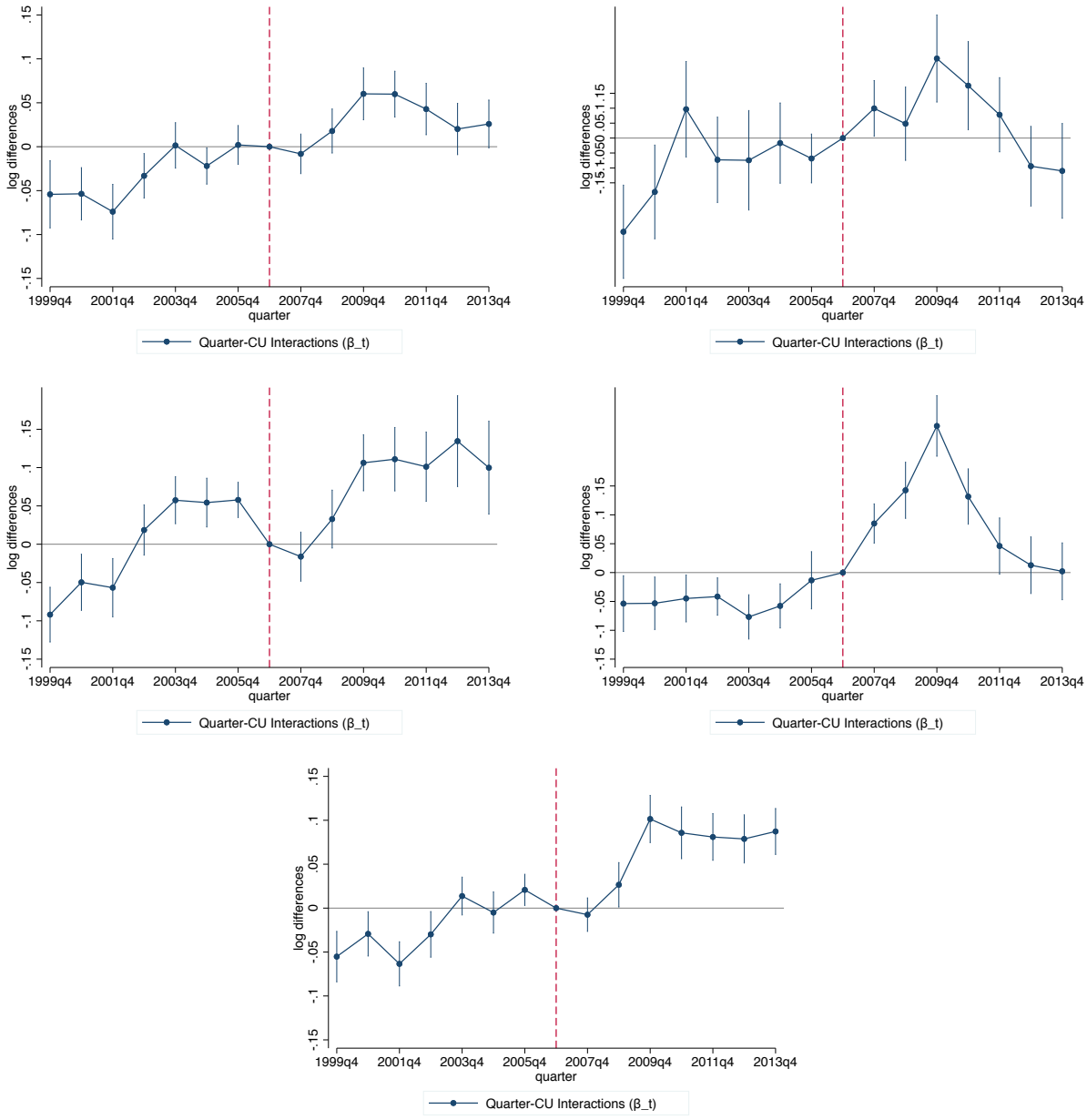
Note. These maps show the percent of total loans and leases originated by credit unions relative to banks before the Great Recession, in 2006 (left panel), and after, in 2013 (right panel), according to the state of the headquarters of the firm. Sources: FFIEC 031, Form 5300.

Figure A3. Coefficient Estimates for Dynamic Regressions: HMDA



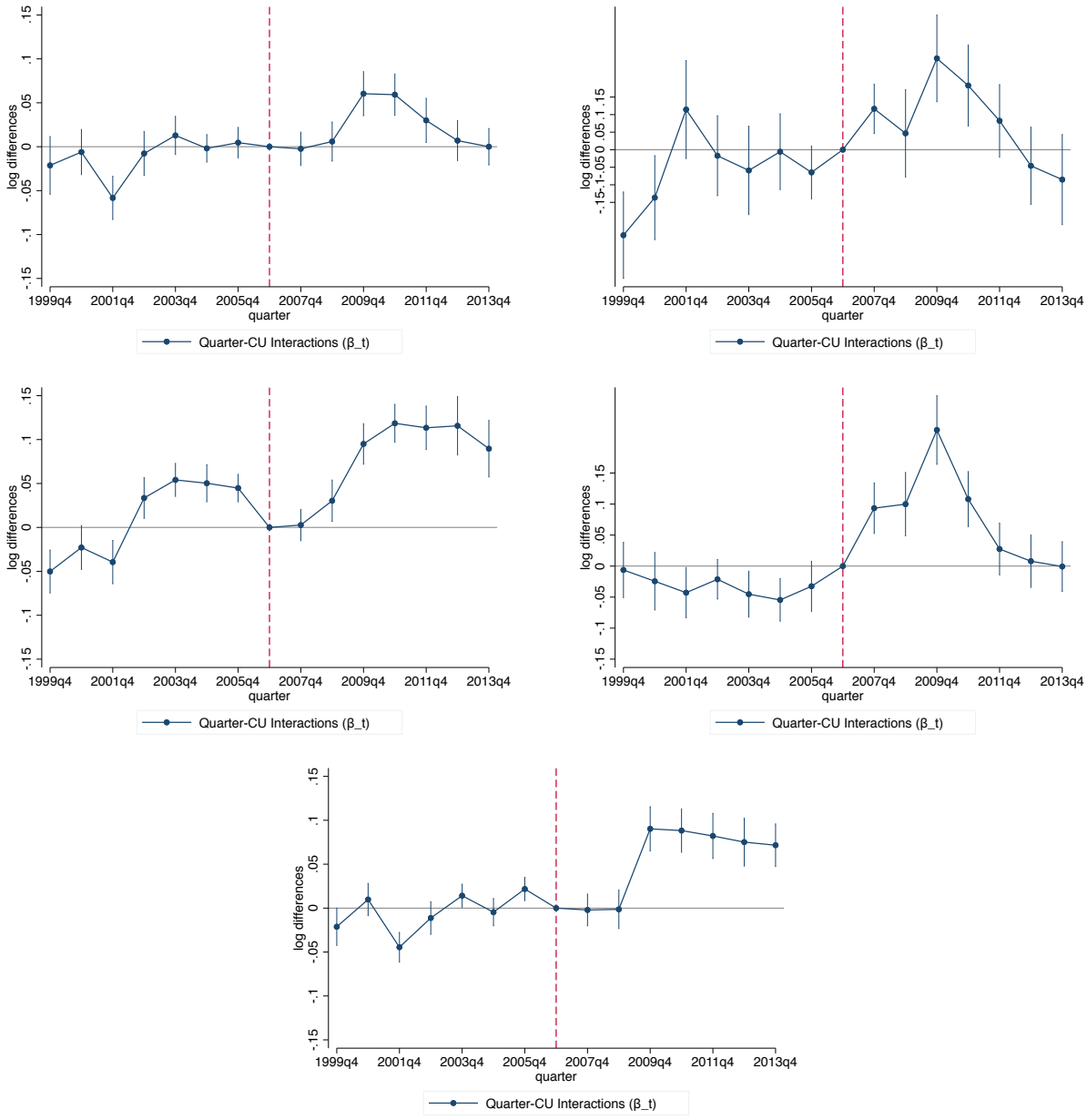
Note. This plots β_t coefficient estimates for the following difference-in-differences regression: $y_{ict} = \sum_t \beta_t \cdot \delta_t \cdot CU_i + X'_{it}\gamma + \text{borrower}_{ict}\gamma_b + \eta_i + \eta_{ct} + \epsilon_{ict}$, a dynamic version of the regressions in Table 4. The dependent variable is log originated loan amounts of various types of mortgages in HMDA between year t and $t-1$ for institution i for borrowers located in census tract c (from left to right, top to bottom: standard purchase, standard home equity, standard refinance, non-standard purchase, non-standard home equity, non-standard refinance, all lending). δ_t are year dummies, X_{it} are balance sheet characteristics interacted with post_t, borrower_{ict} are average demographic and economic characteristics of the pool of applicants, η_i are firm fixed effects, and η_{ct} are census tract-year interacted fixed effects. The sample period is from 2000-2014. Left-out observations are in 2006 (dashed line). Error bars reflect the 95% confidence intervals. Standard errors are clustered at the institution level.

Figure A4. Coefficient Estimates for Dynamic Regressions: Call Reports; Other Balance Sheet Lending; HMDA subsample



Note. This table presents β_t coefficients for the following difference-in-differences regression: $y_{iCt} = \sum_t \beta_t^f \cdot \delta_t \cdot CU_i + \text{post}_t \cdot X_{it}'\gamma^f + \eta_{Ct} + \eta_i + \epsilon_{iCt}$, a dynamic version of the regressions in Panel A (institutions that report HMDA) of Table 6. The dependent variable is log difference of loans and leases for major categories of lending on the balance sheet between year t and $t-1$ for institution i with headquarters in county C (from left to right, top to bottom: real estate, business, consumer, off balance sheet, total lending) δ_t are year dummies, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 1999-2013. Left-out observations are in 2006 (dashed line). Standard errors are clustered at the state level.

Figure A5. Coefficient Estimates for Dynamic Regressions: Call Reports; Other Balance Sheet Lending; All firms



Note. This table presents β_t coefficients for the following difference-in-differences regression: $y_{iCt} = \sum_t \beta_t^f \cdot \delta_t \cdot CU_i + \text{post}_t \cdot X_{it}'\gamma^f + \eta_{Ct} + \eta_i + \epsilon_{iCt}$, a dynamic version of the regressions in Panel B (all institutions) of Table 6. The dependent variable is log difference of loans and leases for major categories of lending on the balance sheet between year t and $t-1$ for institution i with headquarters in county C (from left to right, top to bottom: real estate, business, consumer, off balance sheet, total lending) δ_t are year dummies, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 1999-2013. Left-out observations are in 2006 (dashed line). Standard errors are clustered at the state level.

4 Additional Tables

Table A2. Timeline of Changes in Fees (FHFA, 2018)

Event Date	Change
March 2008	The Enterprises increased ongoing fees and added two new upfront fees: a fee based on the borrower's LTV ratio and credit score, and a 25 basis point adverse market charge.
Late 2008 through 2011	The Enterprises gradually raised fees and refined their upfront fee schedules.
December 2011	Pursuant to the Temporary Payroll Tax Cut Continuation Act of 2011, FHFA directed the Enterprises to increase the ongoing fee for all loans by 10 basis points. This fee is paid to the U.S. Department of the Treasury. This fee increase was effective with April 2012 deliveries and will expire after 10 years.
August 2012	FHFA directed the Enterprises to raise fees by an additional 10 basis points on average to better compensate for credit risk exposure. Fees were raised more on loans with terms longer than 15 years than on shorter-term loans to better align the gaps, and the fees were made more uniform for lenders that deliver larger and smaller volumes of loans. These changes were effective with December 2012 MBS deliveries.
December 2013	FHFA directed the Enterprises to increase ongoing fees by 10 basis points, change upfront fees to better align pricing with credit risk characteristics, and remove the 25 basis point adverse market charge for all but four states. However, in January 2014, FHFA suspended the implementation of these changes pending review.
April 2015	FHFA completed its fee review and directed the Enterprises to eliminate the adverse market charge in all markets and add targeted increases for specific loan groups effective with September 2015 deliveries. These changes were approximately revenue neutral with little or no impact for most borrowers.
July 2016	Based on findings from FHFA's quarterly guarantee fee reviews, the Agency issued direction that set minimum ongoing guarantee fees by product type for the Enterprises, effective in November 2016, consistent with FHFA's responsibility to ensure the safety and soundness of the Enterprises.
December 2017	FHFA directed the Enterprises to meet specified return on capital targets, effective with February 2018 loan deliveries.

Note. Taken from Table 1 (p.8) of the FHFA report "Fannie Mae and Freddie Mac Single-Family Guarantee Fees in 2017."

Table A3. Growth of Mortgage Lending: Excluding Large Banks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Standard			Non-Standard		All
	Purchase	Home Eq	Refi	Purchase	Home Eq	Refi	
Post*CU	0.128***	0.073	0.191***	0.128***	0.155**	0.140**	0.193***
	(0.029)	(0.058)	(0.035)	(0.046)	(0.061)	(0.059)	(0.045)
Borrower Controls	×	×	×	×	×	×	×
Firm Controls	×	×	×	×	×	×	×
Firm FE	×	×	×	×	×	×	×
Tract-Year FE	×	×	×	×	×	×	×
N	2,968,309	912,285	4,990,364	2,474,700	1,090,433	2,275,028	9,536,013
R-sq	0.61	0.72	0.56	0.70	0.68	0.74	0.56

Note. This presents β coefficient estimates for the following difference-in-differences regression: $y_{ict} = \beta \text{post}_t \cdot \text{CU}_i + \text{post}_t \cdot X'_{it}\gamma + \text{borrower}'_{ict}\gamma_b + \eta_i + \eta_{ct} + \epsilon_{ict}$. Compared to Table 4, the sample excludes large banks rather than including a large bank indicator in the regression. The dependent variable is log originated loan amounts of various types of mortgages in HMDA between year t and $t-1$ for institution i for borrowers located in census tract c. post_t equals 1 starting in 2007, X_{it} are balance sheet characteristics interacted with post_t, borrower_{ict} are average demographic and economic characteristics of the pool of applicants, η_i are firm fixed effects, and η_{ct} are census tract-year interacted fixed effects. The sample period is from 2000-2014. Standard errors are clustered at the institution level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively.

Table A4. Interest Rate Offers

	(1)	(2)	(3)	(4)
	Fixed Mortgage	ARM	Home Eq Loan	Home Eq LOC
Post*CU	0.014	0.101	-0.340*	-0.251
	-0.100	(0.319)	(0.201)	(0.195)
N	11,591	6,377	19,735	25,524
R-sq	0.97	0.85	0.87	0.91
	New Auto	Used Auto	Credit Card	Unsecured LOC
Post*CU	-0.717***	-0.669***	0.848	0.197
	(0.118)	(0.132)	(1.259)	(0.332)
N	34,377	34,011	9,271	26,092
R-sq	0.93	0.93	0.89	0.85

Note. This table presents β^r coefficients for the following difference-in-differences regression: $y_{iCw} = \beta^r \text{post}_w \cdot \text{CU}_i + \text{post}_w \cdot X'_{iw}\gamma^r + \eta_{Cw} + \eta_i + \epsilon_{iCw}$. The dependent variables are various borrowing and lending rates in SNL Financial for week w for institution i with headquarters in county C. post_w equals 1 starting in 2008q3, X_{it} are balance sheet characteristics interacted with post_t, η_i are firm fixed effects, and η_{Ct} are county-year interacted fixed effects. The sample period is from 2007-2013. Standard errors are clustered at the state level and are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level respectively.

Table A5. Do Credit Unions Have Informational Advantages? Results for All Institutions

A. Balance Sheet Lending

	(1) Real Estate	(2) Consumer	(3) Business	(4) Off-BS	(5) Total
Post*(CCU)	0.029**	0.059***	0.132***	0.095***	0.052***
	(0.013)	(0.009)	(0.034)	(0.019)	(0.012)
Post*(Non CCU)	0.032**	0.066***	0.126***	0.122***	0.060***
	(0.013)	(0.009)	(0.034)	(0.022)	(0.012)
N	180,970	221,441	116,416	173,169	222,510
R-sq	0.38	0.28	0.35	0.27	0.42

B. Balance Sheet Performance

	(1) TA Growth	(2) Leverage	(3) Cash/TA	(4) NOPAT	(5) ROA
Post*(CCU)	0.053***	0.230	-3.388***	-0.369***	-0.060*
	(0.010)	(0.181)	(0.405)	(0.047)	(0.034)
Post*(Non CCU)	0.062***	-0.474**	-3.085***	-0.527***	-0.155***
	(0.010)	(0.194)	(0.408)	(0.052)	(0.039)
N	223,342	223,342	223,342	223,286	223,342
R-sq	0.46	0.88	0.66	0.76	0.58

Note. This table distinguishes community credit unions from non-community credit unions with the following regression: $y_{ict} = \beta_1 \text{post}_t \cdot \text{CommunityCU}_i + \beta_2 \text{post}_t \cdot \text{NonCommunityCU}_i + \text{controls} + \epsilon_{ict}$. Community credit unions have geography-based *common bond* membership requirements, while non-community credit unions have stricter requirements (for example by occupation or employer). Panel A presents estimates for major categories of lending on the balance sheet on an institutional level, as in Table 6. Panel B presents estimates for performance measures on an institutional level, as in Table 7. Both include all institutions, rather than those that report to HMDA. See notes in these tables for regression and sample details.

Table A6. Do Credit Unions Lend Due to Tax Exemption? Results for All Institutions

A. Balance Sheet Lending

	(1) Real Estate	(2) Consumer	(3) Business	(4) Off-BS	(5) Total
Post*(Hi Tax)	-0.018	-0.052***	-0.116***	-0.103***	-0.044***
	(0.012)	(0.009)	(0.025)	(0.021)	(0.011)
Post *(Lo Tax)	-0.058***	-0.085***	-0.157***	-0.139***	-0.083***
	(0.017)	(0.014)	(0.039)	(0.025)	(0.017)
N	180,970	221,441	116,416	173,169	222,510
R-sq	0.39	0.28	0.35	0.27	0.42

B. Balance Sheet Performance

	(1) TA Growth	(2) Leverage	(3) Cash/TA	(4) NOPAT	(5) ROA
Post*(Hi Tax)	-0.050***	-0.050***	3.204***	0.569***	0.089**
	(0.008)	(0.008)	(0.379)	(0.052)	(0.041)
Post *(Lo Tax)	-0.079***	-0.079***	3.287***	0.301***	0.140**
	(0.015)	(0.015)	(0.437)	(0.058)	(0.056)
N	223,342	223,342	223,342	223,286	223,342
R-sq	0.46	0.46	0.66	0.76	0.58

Note. This table distinguishes banks by tax burden with the following regression: $y_{ict} = \beta_1 \text{post}_t \cdot \text{HiTaxBank}_i + \beta_2 \text{post}_t \cdot \text{LoTaxBank}_i + \text{controls} + \epsilon_{ict}$. Tax burden is defined by average effective taxes paid by banks prior to the crisis. Panel A presents estimates for major categories of lending on the balance sheet on an institutional level, as in Table 6. Panel B presents estimates for performance measures on an institutional level, as in Table 7. Both include all institutions, rather than those that report to HMDA. See notes in these tables for regression and sample details.